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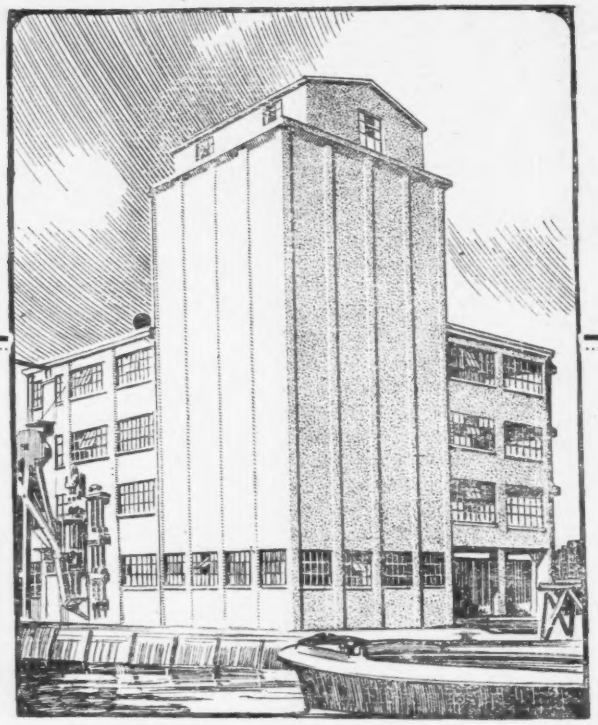

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Food Manufacture

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Vol. II., No. 4 — The editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings whenever possible. — February, 1928

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1928.

THE SECOND month of 1928! By now most of us have had sufficient time to realise that we are, actually, well into another year; we are not misdating cheques and letters quite so frequently, and we have had time to estimate what new resolutions, if any, are likely to run the course of the next eleven months. January's editorial was written under a deluge from the Press of New Year's greetings, coupled with a somewhat bewildering assortment of advice upon the question of new resolutions. In such circumstances we felt it was a matter of good taste to refrain from adding to the pile, particularly as our imagination was not equal to the task of breaking away from the commonplace. It was, therefore, a refreshing experience to read some cheerful words from the pen of a former editor of an American contemporary.

Mr. Cain asks, "What's all the gloom about?" and then proceeds in the following manner: "It is the dawning of the year. No storm yet, no wind, no rain. Just a flush on the far horizon. Everything new and fresh and fine.

"It is like when you move into a new building. Rent paid in advance, walls white as snow, woodwork varnished till you can see your face on its shining surface, brindle fringe on the shelves, floor like a ball-room. No ghosts of old debts and bad days and business mistakes here. You feel like a razor right off the whet-stone, a pitcher of water fresh from the old spring at the foot of the big hill. After a while the sales force may go on a strike, the walls sag, and the fringe gets frayed, but right now the dew sparkles on the pansy.

"A fresh start helps a man more than anything else in the world. It gives him new shoes for his old feet and a college hat with ribbon around the crown for his grey head. It wipes the tears from his eyes, the creases from his face, and the pains from his heart. It gives him new tyres and fills the gasolene tank. It balances his book at the bank and chases the remorse from his soul. It plays on the spotless ivory keys of a spangled grand piano the prelude for a grand old song. It washes him and shaves him and combs his hair and arrays him in fresh linen for the Sunday morning service. It weaves honeysuckle vines around the pillars of his old front porch."

This is the most stimulating outlook for the New Year we have so far come across, and if there is to be no monopoly in these experiences, we would like to join with Mr. Cain in furthering this doctrine of an annual resurrection.

Sulphur Dioxide.

It was our good fortune to attend, on January 11, in London, a meeting of the Society of Public Analysts. It was what one might term a "preservatives evening." Mr. J. R. Nicholls read a paper on the determination of benzoic and cinnamic acids; this was followed by a number of papers dealing with

various important practical points involved in the rapid determination of sulphur dioxide in foods, and representing the main results of the labours of the Preservatives Determination Committee of the Chemists of the Manufacturing Confectioners' Alliance, Food Manufacturers' Federation. Abstracts of these papers are given elsewhere in this issue, a more complete report being given in the February number of *The Analyst*.

It speaks well for the spirit of the food industry as a whole, and particularly its attitude towards the consuming public, to have found at this meeting representatives of the Government laboratories, the public analysts, the Research Association, and the manufacturing firms themselves, all gathered into one room, with the object of thrashing out the problems and difficulties attending the estimation of preservatives. We must also confess our astonishment at the promptitude with which these problems have been tackled and at the progress that has been made in their elucidation, and in this respect special credit is due to Mr. Macara and Dr. Monier-Williams.

It was quite obvious from the general tone of the meeting that the representatives of all sections were out to do everything within their power to ensure the highest attainable purity in manufactured foodstuffs. If any further proof of this is needed, one has but to recall the immense amount of voluntary work that has been undertaken by the many manufacturing firms and their chemists in pursuit of knowledge in the interests of public health.

Industrial Efficiency.

It is now some time since a report entitled "The Secret of High Wages" was made by two English engineers on the results of their investigation of American industrial methods and conditions. The contents of this report have been widely quoted in America as a tribute to the efficiency of that country.

For the benefit of those who have not had the opportunity of reading this report, we give below the nine principles of industrial management to which are attributed the industrial success of the United States.

1. Promotion by merit. There is social snobbery in America as everywhere else, but there is no industrial snobbery. Personal efficiency is rewarded.

2. Small profits, large volume. The larger the output, the lower the per unit cost. Simplification and standardisation.

3. Improvement of process. Means lowering of costs.

4. Time-saving and trouble-saving appliances. Automatic machinery. Labour-saving devices. "Restriction of a man's output is ruinous to every democratic interest."

5. No limit upon possible earnings of any man. The employers are not hostile to high wages. Wages have risen more than prices.

6. Exchange of ideas, even among competing companies.

7. Elimination of waste.

8. Welfare work, surrounding the worker with cleanliness and light, seeking to increase his conveniences and satisfaction.

9. Utilisation of research.

High Wages and Cheaper Production.

The above report arrives at some interesting conclusions:

"The very life of Great Britain depends on two things—the deliberate adoption by employers in this country of a policy of high wages; and the intelligent understanding on the part of the men that every mechanical aid to efficiency must be used to the utmost, that the organisation of cheaper production on American lines must be accepted, and that restrictions on individual output must be swept away."

In their study of conditions among American working men the conclusion was reached that:

"The industrial workers, the rank and file of its democracy, have attained standards of earnings and comfort and possession and rational enjoyment beyond anything that the ordinary man in this country conceives. The United States presents a spectacle of relative power and confidence, accumulation and economic achievement, without any parallel in the world's history."

Science and Confectionery.

Mr. S. M. Gluckstein, a director of Messrs. J. Lyons and Co., Ltd., in the course of an address to the Institute of Chemistry on October 19, 1927, asked in what manner can science be best applied in assisting the development of commerce. The answer to this question Mr. Gluckstein himself supplied in the following words:

"As I see it, the functions of science in this application can broadly be set down under three main headings:

(1) Control and standardisation of methods of manufacture, which includes accurate costing and estimating;

(2) improving the existing methods of manufacture and production—*e.g.*, doing old jobs in better ways, and—

(3) giving the manufacturer new ideas, and teaching him how to develop some new line—*i.e.*, suggesting, in fact, new jobs to be done."

Mr. Gluckstein then went on to discuss in greater detail how, in practice, these principles are applied, with particular reference to the confectionery

industry. Since this part of his address is of special interest, we have reproduced it in full on another page.

Food and Health.

We have been reading a small book on Food and Health, written by Mrs. A. B. Callow, who, by the way, is the wife of a frequent contributor of articles to FOOD MANUFACTURE. Mrs. Callow is to be congratulated on her treatment of a subject, which, although it stands well in the limelight of public interest and is of fundamental importance to each one of us—for, to quote from the chapter on "Digestion,"

> It's a very odd thing—
> As odd as can be—
> That whatever Miss T. eats
> Turns into Miss T.;

—yet is one that has been so shamelessly maltreated and exploited by competing camps of cranks and fanatics, both in the Press and by a host of pamphlets and books, as to leave the ordinary person absolutely bewildered. Of course, there have been sound and reliable books, but in most instances they have been either too "popular" or else too abstruse for all ordinary purposes. Mrs. Callow, however, has given us "an introduction to the study of diet," which, coming from the pen of a scientist who has no particular axe to grind, is a plain statement of such facts as have so far been established; at the same time, it is written in a bright and attractive style which induces one to linger over its pages.

Prune Jam.

Some information concerning the manufacture of prune jam or "pekmez" in Jugoslavia has been furnished by the American Consul at Belgrade. Pekmez is a kind of plum jam which is obtained by cooking prunes in large boilers containing sometimes from 1,100 to 1,500 pounds of prunes. When the prunes are well cooked, without adding sugar or anything else, they are poured into barrels through sieves, which prevent skins and pits from getting inside. The hot liquid becomes thicker when it cools. This method varies slightly in different places in Serbia and Bosnia, and only personal acquaintance with the local methods could give one an accurate idea of the preparation of Jugoslav pekmez.

Synthetic Vinegar.

According to a report from Stockholm, the Stockholm's Superfosfat Fabriks Aktb., a £1,000,000 corporation engaged in the manufacture of chemicals, expects to begin manufacturing synthetic vinegar in the near future. For this purpose a new building will be added to the corporation's Stallbacka plant, which is already quite large. The output of vinegar in Sweden at present is by no means sufficient to supply the domestic demand. According to present plans, power for running the new factory will be supplied by the State hydroelectric station at Trollhattan.

What's in a Name?

There are still people who maintain that names are an indication of character, and we seem to remember having seen a small book which explained the whole subject in a very fascinating way.

More than once it has occurred to us that "Pectin" would make a very pleasant-sounding, and even stimulating, name for one destined to spend his (or her?) days over the jam-boiler, or, as someone has expressed it, "putting the jell into jelly," but after looking up Ehrlich's interpretation we have definitely abandoned the idea. According to this authority, pectin is the "calcium-magnesium salt of a complex anhydro-arabinogalactose-meth-oxyltetra-galacturonic acid"!

New Zealand's Prosperity.

Evidently there is one country, at least, that wears a happy smile. New Zealand is reported to be emerging from her brief period of depression, and it is said that goodwill exists generally between master and man. The Tariff revision was accomplished without disturbing industry, and bids fair to reduce the costs of production and living generally. The external trade is improving.

August and September showed a remarkable increase in dairy production over the same period in 1926; butter amounted to 7,793 tons, as compared with 5,942 tons, and cheese production totalled 3,777 tons, against 3,289 tons. There is every indication that production and export of dairy products this season will constitute a record. We confess to a great admiration for progress, and will take this opportunity of offering our best wishes to New Zealanders for a prosperous year.

German Conventions.

The marmalade group of the Vereins der Konserven-Industriellen met at Cologne on January 19 to consider questions relating to prices. From January 29 to February 4 the great agricultural convention was held in Berlin.

U.S. Dairy Council.

We note that C. W. Larson has resigned his position as chief of the Bureau of Dairy Industry, and has been appointed director of the National Dairy Council, an organisation representing the various branches of the dairy industry. One of the

chief functions of the Council is to promote health and child welfare through education of the public.

Russian Fruit Packing.

A commission consisting of representatives of the Gostorg (State Trading Company) of the Russian Socialist Federated Soviet Republic, of the Gosselsklad (State Agricultural Storehouse Company) and of the Fruit Growers and Vineyard Co-operative Union, has left Moscow for California, for the purpose of purchasing special machinery for sorting, packing, preserving, and drying of fruit. The commission, while in California and other western States of the United States, will study the methods used in this work in America. Besides making purchases, the commission is empowered to invite from Russia to the United States specialists in the field of mechanising the packing of fruit.

New Fish Canning Factories.

The construction of a factory for the preparation of canned and frozen fish is projected at the Port of Mar del Plata, in Argentina.

At Invercargill, in New Zealand, a new company, known as the Southland Sea Products Company, Ltd., has been formed with a very strong financial backing. The new firm expects to can oysters and crayfish.

The Sveriges Forenade Konservfabriker, Goteborg, Sweden, probably the largest fish canning concern in this district, has, among others, an old canning factory in the city of Goteborg which will be closed down, and a new one will be built close to the harbour basin set aside for fishing boats. The plans for the new factory have not been finished, but it will be a comparatively large one, costing, it is stated, from £100,000 to £160,000. It is not yet decided what kind or make of machinery will be purchased and installed, or from what source. The same concern will also rebuild and extend its factory in the city of Lysekil.

Dogfish Liver Oil.

Professor Asmundson, who is in charge of the poultry husbandry department at the University of British Columbia, finds that dogfish-liver oil contains vitamin D and is equivalent in medicinal value to the best cod-liver oil on the market. This confirms the results of some preliminary experiments carried out by H. N. Brocklesby at the Prince Rupert Fisheries Experimental Station. Professor Asmundson has used chicks in his experiments, whilst those at Prince Rupert were made with Albino rats. It is hoped to establish this oil as a commercial medicine.

Pineapples.

The *Commercial and Industrial Gazette* for September, published by the Government Printer, Pretoria, contains a report made by the Low Temperature Research Station, Cambridge, on the results of observations made on the condition of pineapples arriving in London from the Union during the months of October, November, and December, 1926.

It is suggested that the type of package was unsuitable, and that a single-layer package large enough to allow a considerable quantity of wood-wool around each pine would give better results, and that the pines were picked too immature and were not uniformly coloured.

Forthcoming Articles

Colouring Matters in Food, II. and III.—F. W. Andrews.

Factors Influencing the Baking Properties of Flour.—T. H. Fairbrother.

Scientific Control in the Flour Milling Industry.—C. W. Herd.

Tin Plate in the Canning Industry.—H. Serger.

Climate and Candy.—R. H. Morgan.

The Efficiency of Fuels, III.—"M.I.M.E."

The Candying of Fruit.—W. V. Cruess.

Eggs: Production, Grades, Preserving, Uses.—T. G. Joyce.

Power Economy in the Food Factory.—"Kilowatt."

Gelatine II and III.—P. I. Smith and K. Pearson.

Margarine Manufacture, II.—Paul Arup.

Fruit Juice Powder.—H. Lüthje.

Experiments of Interest to Canners.—W. V. Cruess and J. Parcell.

The Rôle of Pure and Applied Science in Industry.—Dr. Callow.

Colloid Chemistry and Food Technology.—Dr. W. Clayton.

The Salmon Canning Industry.—Dr. E. D. Clark.

The Manufacture of Pickles.—C. E. Searle.

Protein Digestion.—J. Wilson.

The Culture of Mushrooms for Profit.—E. Jacobsen.

Food Manufacture from the Consumer's Point of View.—Mrs. A. B. Callow.

Colouring Matters in Food

By F. W. ANDREWS,
British Dyestuffs Corporation, Limited.

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We give below the first of a series of important articles on colouring matters for foodstuffs. These articles, representing the fruits of many years of specialised experience, set out, in a manner readily understandable by all, the general rules and finer points to be observed by the user in applying colours to foods and, equally important, point out the pitfalls and dangers to be avoided. The application to the various confectionery and meat products is dealt with in detail. Finally, the author will discuss the question of purity in relation to food-colours.

PART I

FROM TIME to time letters appear in the Press relative to the practice (usually referred to as a scandal) of colouring foodstuffs, implying that the only purpose for which colours are used is to disguise inferior material or to assist adulteration; but we have progressed far since such accusations contained a modicum of truth.

The public demand that the food they eat shall have a representative appearance. The natural colour is often marred or destroyed in the manufacturing processes, through heat or other causes, and is therefore recoloured by artificial means to make an appeal to the eye. A much more important point rests on the authority of the greatest scientists of the day—namely, that this psychological appeal has a definitely stimulating effect upon the digestive processes.

The colouring of foodstuffs was accomplished for many years by products of vegetable, mineral, and insect origin, but this unsatisfactory method has been almost entirely superseded by the use of synthetic dyestuffs, which are subject to less variation and possess far greater tinctorial power. Originally, the whole range of dyestuffs was at the disposal of the confectioner, but recent legislation has commenced a weeding-out process which will, no doubt, eventually put us in a similar position to America and the Colonies, where only a few specified colours are allowed. I consider this to be all to the good. It would enable the colour manufacturer to concentrate all his energies on the perfection of a few types, with which the consumer would eventually become thoroughly acquainted, and thus solve for himself half the difficulties he is to-day experiencing.

The problems of the foodstuff trade differ in many respects from those encountered in any of the main colour consuming industries, the chief points of difference being in the necessity for harmless colours and the maintenance of standard shades. The many classes of foodstuffs for which colours are in demand and the difference in the problems from those encountered elsewhere, have compelled manufacturers in this country to specialise in the provision of suitable products.

First in importance is the necessity for all colours to conform to the law as regards toxic matter. This question demands much fuller treatment than can be given at this stage, and I hope to devote a later article to the subject.

The colours used by the textile trades change with fashion and customer's requirements, whilst the confectioner's product is known by the colour it maintains, the slightest variation in the shade being immediately construed by the public as a definite indication of a detrimental alteration in the product itself.

Sulphur Dioxide

The necessity for this, and many other articles which have been recently written on the subject of foodstuff colours, has arisen from the introduction of Sulphur Dioxide (SO_2) as a preservative. This product, which is added to the article chiefly in the form of sulphites, has a powerful bleaching action on most colours, some of which are completely decolourised and nearly all altered to some degree. Fortunately for the colour manufacturer, the permissible quantity is limited, and although even this is sufficient to decolourise some dyestuffs, it makes in others no perceptible change. The chief colours at present obtainable in this country in sufficient purity for the colouring of foodstuffs are as follows:

Acid	*Basic*
Tartrazine.	Rhodamine.
Ponceau 2R.	Bismarck Brown.
Acid Yellow G.	
Amaranth.	*Direct*
Erythrosine.	Benzo Purpurine.
Orange I.	
Orange II.	*Oil Soluble Colours*
Carmoisine.	Oil Orange.
Indigo Carmine.	Oil Yellow.

Of the acid colours in this list, the following only will satisfactorily stand the action of sulphur dioxide in the permissible quantity:

Erythrosine.	Ponceau 2R.
Tartrazine.	Amaranth.

It will be seen that the fast colours are very few, but, fortunately, they comprise the chief yellows and reds. No doubt, later on, additions will be made to this range, but in the meantime these colours and mixtures of them represent the only safe products for the confectioner who has to contend with sulphur dioxide (SO_2).

I would mention in passing that one reason why users find their colours are affected by SO_2, although recommended as fast by the manufacturers, is because of the method of making up two solutions, one of colour and one of preservative, and mixing them together before adding to the foodstuff. The large quantity of preservative present is often sufficient to affect the colour, which would stand the ordinary quantity distributed over the product. To obviate fading, the colour and preservative should be made up into separate solutions and added separately.

It is sometimes suggested that the best method of overcoming the bleaching action of SO_2 is by adding, in the first place, an excess of colour, which, when partially bleached, gives the required tint. This I do not consider entirely satisfactory, as the final shade cannot be controlled to any degree of accuracy. The best process is by first of all "killing" the SO_2 with a colour like Carmoisine, which has a reducing action, and then retinting to the required depth.

Fastness Troubles

The other essential properties which must be possessed by the foodstuff colour are fastness to light, heat, alkali, and acid. Various other fastness troubles may arise, such as metals and special manufacturing processes, but these are only isolated cases. Generally speaking, the acid colours previously mentioned possess reasonable fastness to light, although continued exposure to strong sunlight in shop windows will cause fading. The products, however, are usually consumed before serious fading takes place, and the practice of long exposure should be discouraged by the manufacturer.

The range also possesses good fastness to heat, but it must be remembered that all synthetic dyestuffs are eventually destroyed by heat, and any special temperature that the colour is required to stand should be specifically mentioned when the manufacturer is standardising his colours.

The acid colours generally are fast to acid and alkali with one or two exceptions. Orange I reddens considerably in the presence of alkali, and Acid Yellow G does the same in the presence of acid, whilst Erythrosine is completely insoluble in acid solutions. Benzo Purpurine is changed to a blue by acid, but as the use of this colour is practically confined to the dyeing of polony skins, it is not a serious matter so long as the preservative is not brought into contact with it at any stage of manufacture.

It will be seen, therefore, that great care should be exercised in the selection of the range, and I would impress upon consumers the necessity of supplying complete information as to the processes and ingredients the colour is required to stand. The colour manufacturer is not concerned with the process apart from its possible action on the colours, and whilst the user is naturally reticent about certain details, he should always, when inquiring for a colour, give full information regarding the material to be coloured, temperature, and manufacturing processes. So often have I found complaints of fading due to a small addition, for instance, of bleached glucose, which was considered too unimportant to mention.

Blending

The foodstuff manufacturer does not make sufficient use of the possibility of blending colours to his individual requirements. By blending his colours he has a larger range at his disposal; he is able to purchase larger quantities of these primaries at a correspondingly cheaper price, and he is also cognisant of the properties of the colours in his blend and their suitability for his processes. The textile dyer has brought this to a fine art, and it is considered the hall mark of a good dyer to use only the three primary colours—red, yellow, and blue. Considerable advantage would accrue to the foodstuff manufacturer if he standardised just a few colours and blended them to the required shades. He must, however, remember that basic types will not blend satisfactorily with acid colours, but information on this point can, of course, be given to him by the colour manufacturer.

Method of Dissolving

This would appear, *prima facie*, a rather elementary subject, but it is one which the writer has found to be the cause of much trouble in the foodstuff trade, especially where blended colours are used. The degree and rate of solubility of dyestuffs differ, and when a three-colour blend consisting, perhaps, of red, yellow, and blue is dissolved in the ordinary way and used in the goods immediately, a variation in shade is sometimes obtained due to the fact that the red and yellow have dissolved more quickly than the blue, of which a quantity is left in the vessel or filtered off as sediment.

The best way to mix colours is to moisten first of all the powder with cold water to a thick paste and then add the hot or boiling water afterwards. The colour solution should be made over night, if possible, and given a thorough stirring before use next day. In this way complete solution will be effected, specking will be avoided, and full value obtained from the colour. It should be remembered that these colours are all reasonably soluble in cold water, and that hot or boiling water is simply used to expedite solution. It is not necessary to boil colours for any length of time, and this should be avoided.

(To be continued.)

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Looking Backwards

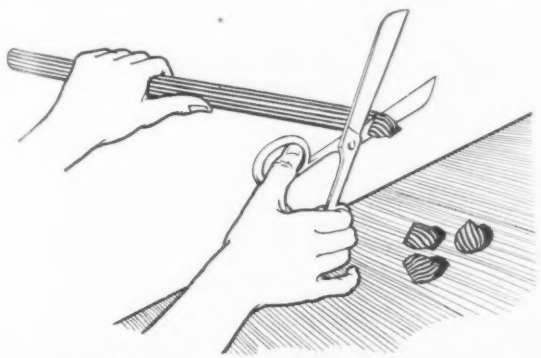
By "AN OLD SUGAR BOILER"

In order to catch a glimpse into the future, it is necessary to know what has happened in the past. An old-timer, who has been in the candy business for the past thirty-five years, indulges in some interesting reflections.

WHEN ONE has been engaged in an industry for close on four decades, especially during the period when really big advances have been made in its technique, in the ingredients used, and in the machines necessary for its manufacture, it is not too much to claim that one can very definitely put a finger on a few of the more important improvements. It is very interesting, too, to note the gradual way in which one thing has led to another, until we eventually arrive at a method or machine which makes us instinctively say: "This is the last word in this process; we shall never advance appreciably beyond this point!" Prophesying is, of course, easy, and prophets are frequently wrong, but it is easy to recognise a big step forward and to realise that some designer or other has been years before his time and produced something ahead of the eye.

Old-time Methods

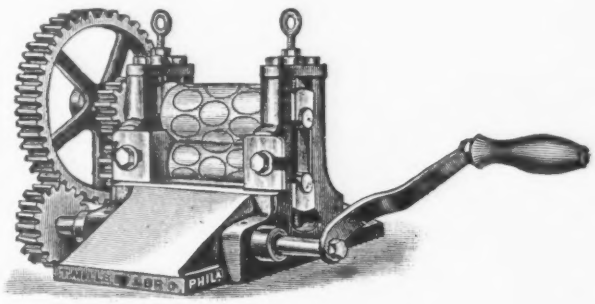
The writer is interested particularly in the art of sugar boiling. The term, as applied to what one may justly call the foundation of the sweet manufacturing business, is a most interesting and fascinating branch of this great industry. Looking back over the past thirty-five years, during which the writer has been connected with the trade, he can remember well the days when some of the old sugar boilers used to tell us how things were done in their young days, and some of the methods that were employed then were most interesting. Vinegar was used then to kill the grain of the sugar, and the fact that vinegar varied in strength didn't worry them a jot. They didn't make a hundredweight at a time: 10 to 15 lbs. was the size of their boilings, an amount which one man could handle and look after with the care that sweets deserve. Humbugs were cut with shears, and even balls were hand cut—the hand-saw was unknown in

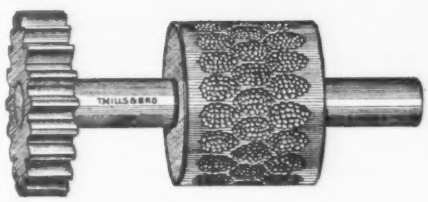


Old Method of Cutting Humbugs by Shears.

The Old Hand Saw (Ball Roller Machine).

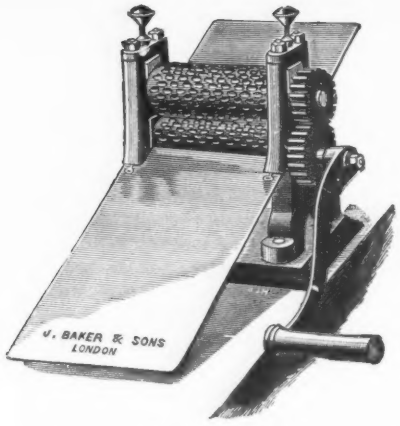
those days—and rolled by hand. The hands of the girl and lad who rolled those sharp-pointed humbugs into round balls became as hard as cast-iron. The hand-saw made bigger batches capable of treatment in the same time as smaller ones before, and boilings increased to about 28 lbs. each. Even then the





Old Type Roller.

method was slow, to modern ideas, and the number of hands required to make a decent boiling of balls was four—the puller-off, the ball-saw operator, the roller, and the keeper-up. You won't find those titles now in the Ministry of Labour's list of trades. The last named, perhaps, requires explanation. The keeper-up kept the balls in motion so that they would retain their shape. Compare this method with the ball machines of to-day, and note how we have progressed.



Drop Roller.

The Drop Roller

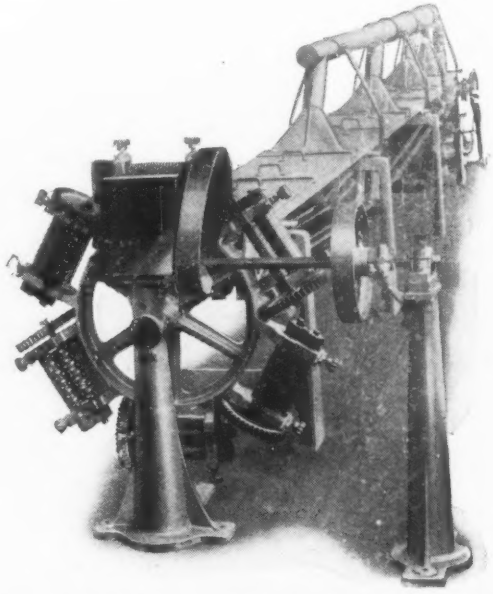
In due course the 4½ inch drop roller made its appearance. This was a distinct step forward, and to watch the gradual growth of this machine, until it reached the huge interchangeable continuous drop roller machine of to-day, was a revelation of the attention and brain power that was being poured out lavishly by engineers in improving and simplifying the manufacture of drops and tablets. Similar investigations have been made in all branches of the sugar confectionery trade, and, just as the drop roller developed, so may it be truthfully said that every process in the art has similarly been perfected from the mechanical point of view.

Sugar Boiling

Perhaps the most remarkable development of all has been in the machines used in the boiling of the sugar itself, and here I do think that we have come as near perfection as possible, and that it will be a long time before any big advance will be made over existing machines—minor improvements, perhaps, but nothing that is, structurally, a startling improvement. I look back to the days of the coke stove with all its disadvantages: there are still plenty of sugar boilers who look upon this, even yet, as the best method. Most of them, however, have been won over to the up-to-date methods, using continuous cookers and vacuum Eurekas, owing to their obvious advantages of cleanliness of operation and of the increased output rendered possible by them. The employment of the continuous cooker has been given a "leg-up" by the decrease in insurance costs with the use of high pressure steam plants, and this and the tremendous saving effected by H.P. steam have been the chief factors in inducing manufacturers to adopt this, the last word in accurate sugar boiling. Let us trace these machines through the decades a little more at length. The open fire boiling I have already mentioned, and the next step forward was boiling in a vacuum. The first vacuum sugar boilers came over to this country after the Chicago exhibition, and were secured by several leading English and Scottish firms with certain rights in their use. I remember a good deal about those days because when, a little later, vacuums were made in this country, a most interesting lawsuit followed, and as I had been working one of the first vacuums in dispute, I was called as a witness in the case. Vacuum cookers were modified and improved and were generally quite satisfactory, but most of us who were engaged in the trade felt that we were looking forward to something better and that we had not reached finality in this particular side of our business. The first step was the elimination of the batch process and its replacement by a continuous process —without doubt, the ideal to be aimed at in all manufactures, especially those dealing with sweets. We were very near it with the Eureka Continuous Boiling Plant, but these were low pressure machines. It wasn't until the two factors, already mentioned, relating to the use of H.P. steam, began to exert their influence that most of us realised that the continuous plant, using H.P. steam, was the "promised land" to which we had been looking. In this short survey of the art of sugar boiling, I have not space to deal with any machinery at length, and it must suffice to say that this machine is capable of boiling almost anything from 100 per cent. glucose down to pure sugar with a minimum of cutting agent, not forgetting fat mixings such as toffee, the latter process being rendered possible by a spiral stirrer. The chief attraction to one who remembers the time it took to boil a batch in the old days is the speed with which the boiling is done; this obviously results in a minimum of decomposition and gives goods with a first-rate colour and keeping qualities.

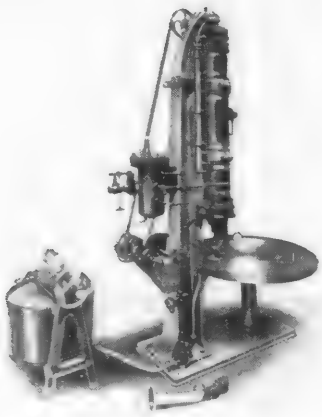
Triumph of Engineering

One might trace other sides of the sugar confectionery industry with equally startling contrasts between the methods adopted forty years ago and those in use to-day; in some cases it is quite clear that we have not reached finality, in others, we can



The Baker Perkins Automatic Plate Drop Roller Machine.

Coke Stove.



Present Day Continuous Cooker.

go almost as far as to say: "Well, I don't ever want anything better than this!" Whichever be the case, I do think, speaking as a practical manufacturer who has known all the difficulties the early days, that we owe a great debt to all the skilled brains, engineers, experimenters, and all those whose ideas have helped us to reach the present standard of excellence in our work, largely if not entirely due to the way in which they have assisted our manufacturing methods by ingenious mechanism. A woman's work, they say, is never done—more's the pity. It is equally true of an engineer's work: he is always trying to improve, and this is an expensive business. Machinery, therefore, may sometimes be expensive, but the original outlay is nearly always worth while, and it is frequently the last money spent on the plant. The life of most machines in the sugar confectionery trade is more or less indefinite—only the other day I saw one of the early type continuous cookers, twenty years old and still giving good results.

(*Continued from page 260.*)

And, as these constituents are part of a quantity of coal weighing 100 pounds, when its elementary moisture is included, the amount of air necessary per pound of coal is:

$$\frac{1061 \cdot 57}{100} = 10 \cdot 62 \text{ pounds.}$$

There is a useful working formula for calculating the approximate weight of air required for combustion. It runs as follows:

$$\text{Weight of air} = 12C + 36\left(H - \frac{O}{8}\right).$$

Where the weight of carbon, hydrogen, and oxygen is represented by their symbols C, H, and O, the amount of hydrogen rendered inert by the oxygen is allowed for, and the proportion of oxygen and nitrogen in the atmosphere is taken as one to four. In practice, it is necessary to furnish sufficient air in excess of the calculated amount to ensure complete combustion in all parts of the furnace.

The results of failure, or of excess, in air supply are far reaching. If less than the calculated amount is supplied, a portion of the carbon will pass off unconsumed, and will form smoke. A part of the remaining carbon, being insufficiently supplied with oxygen, forms carbon monoxide, the typical product of incomplete combustion. On the other hand, if air is supplied in excess of the quantity required for complete combustion, there is a two-fold loss to be encountered. In the first place, the excess of air entering the furnace is heated by the burning fuel, thereby lowering the temperature of the mixture of air and gases below the temperature which would prevail if the gases alone were present. The result is that the rate of absorption of heat by the water is reduced, since this is dependent upon the difference in temperature between the water and the gases. Secondly, owing to larger volume and increased velocity, the temperature of the mixture of gases and air escaping to the chimney is higher than would be the case if there were no excess of air. In fact, the increased volume is such that the total amount of heat carried away, without exerting any useful effect, is greatly increased. This statement may appear somewhat paradoxical, but it remains a fact that the larger the volume of air supplied, the higher will be the temperature of the escaping gases.

(*Continued from page 263.*)

1926, and 63 per cent. by January, 1927, when observation was discontinued. The cans stored at 32° F. remained in merchantable condition, without the formation of a single springer or the perforation of a single can, for more than two years. This is a striking illustration of the importance of low storage temperatures, and is applicable to all products which tend to form springers and to perforate the cans.

The corrosion of the can is accompanied by a loss in the colour of red fruits. The cans mentioned above as having been stored at 32° F. retained their original colour during the entire two years of storage, while the colour of those stored at other temperatures gradually grew fainter because of the slight amount of corrosion that caused the perforation of the cans or the bulging of their ends.

Canning Research

We have received Bulletin No. 103-A, "Scientific Research Applied to the Canning Industry," which has just been issued by the National Canners' Association, Washington, D.C. This interesting and instructive pamphlet gives a survey of the scientific work carried out in the Association's laboratories, and we reprint a portion of it below. That part of the pamphlet dealing with "technological operations" will be given in the next issue of FOOD MANUFACTURE.

PART I.—TIN PLATE INVESTIGATIONS

THE TIN plate studies for the most part have centred about the following questions: (1) Amount of tin dissolved by contents of the can; (2) discoloration and corrosion of the interior surface of the cans; (3) perforations; (4) rusty exterior surfaces; (5) discoloration and bleaching of contents; (6) springers and hydrogen swells. With reference to these questions various factors have been studied, with the results hereafter briefly described.

Weight of Tin Coating

The thickness of the coating of tin, or as it is more commonly expressed, the weight of tin coating, has been found to be without influence on the rapidity with which tin is dissolved from the container by the contents. The majority of foods have a very slight solvent action on tin. Generally speaking, this solvent action is greater with fruits than with vegetables, but for those fruits which have the greatest solvent action (red fruits such as berries and red cherries) a lacquer is used to protect the colouring matter of the fruit, and this lacquer also protects the tin from solution. All products, however, dissolve tin just as readily from heavier coated plate as from plate of lighter coating.

The ordinary tarnish which causes the general discoloration of the interior surface of cans containing meat, fish, and many vegetables is due to tin sulphide, and it forms just as readily on heavily coated plate as on plate of lighter coating. The bleaching of red coloured fruits is independent of the weight of coating of the tin plate.

The tarnish on the interior of cans containing protein-bearing foods is sometimes mistaken for corrosion. As a matter of fact, such cans are not usually corroded, and the discoloration is due to the combination of the tin of the container with the hydrogen sulphide liberated from the protein of the food by processing. As stated elsewhere, some foods have a tendency to dissolve tin from the container and thus exert a general corrosion over the inner surface of the can. When such corrosion does occur, the inner surface of the can is not discoloured unless the corrosion occurs to such an extent as to remove the tin coating and expose the steel base.

The general corrosion of the interior surface of the can is independent of the weight of tin coating, but because of the crystalline structure of the tin such corrosion is much more apparent on heavily coated plate than on plate of lighter coating. On this account a person without experience in this particular matter, on looking at the inside of a heavily coated can which had been used for processing an acid food and then emptied of its contents, would form an exaggerated opinion of the amount of corrosion that had occurred.

The weight of coating has been found to have a definite influence on the speed with which perforations occur. Just why this is true is not known, because there appear to be uncoated spots even on heavily coated plate. Certain it is, however, that when used for red berries that ultimately cause perforation, cans last at least several weeks longer, and sometimes several months longer, when made from heavily coated plate.

The amount of tin coating has a direct influence on the resistance of the plate to rust, and heavily coated cans therefore resist rusting better than those of lighter coating.

Composition of the Steel

Much experimental work has been done to determine in what manner the composition of steel used as the base of tin plate might be varied, and in that manner increase the service value of tin cans. It was found that different lots of tin plate with the same weight of tin coating may have widely different service value. This indicated that the difference in service might be due to a variation in composition, a knowledge of which would lead to improvement of the plate, but it has not been found possible to determine any particular composition which is especially desirable for tin plate and which will increase its service value. There are indications, for instance, that a high phosphorus content and a bad distribution of phosphorus are disadvantageous, but that is about as far as present information goes, in addition to the general information that the industry has long had regarding the composition of steel.

A special study has been made of copper-bearing steel because of its well-known resistance to rust. It has been found, however, that cans made of copper-bearing steel are at least as subject to corrosion as cans made from ordinary steel. An investigation of this subject is being extended to chromium steels, and chrome-nickel steels and other alloys are being studied to ascertain their suitability for the manufacture of cans.

Function of Tin-Iron Alloy

In the early days of tin plate manufacture the steel was left submerged in molten tin for a longer time and

was subsequently heated in oil. This must have given a greater thickness of tin-iron alloy at the juncture of the two metals than is formed with the present methods of manufacture. This hypothesis led to a study of tin plate heated for various lengths of time so that different thicknesses of tin-iron alloy would be formed. It was found that a substantial increase in the amount of this alloy reduced the resistance of the cans to perforation.

Enamelled Cans

In order to prevent the loss of colour of certain canned fruits, the so-called enamelled cans (or lacquered cans as they are sometimes termed) have been developed. This enamel, of course, prevents the general corrosion of the inside of the can, but the lacquer is not entirely continuous and cans so treated perforate to a greater extent than plain ones. Enamelled cans have been used to an increasing extent for something more than fifteen years, not only with red fruits, but also with some of the more acid vegetables that have a pronounced flavour of their own, such as beets and pumpkin. The enamel used for these products cannot be used with certain vegetables that have a more delicate flavour, such as asparagus and string beans, because it imparts an objectionable flavour to the product.

During recent years a special lacquer has been developed for products that have a tendency to form iron sulphide discoloration, especially corn. This special lacquer will not answer for acid products such as fruits, but has been found to prevent the iron sulphide discoloration for which it was developed and also to prevent the general tarnish to the inside of a can due to the formation of tin sulphide.

Springers and Hydrogen Swells

The slight solvent action of fruit acids on metals is accompanied by the evolution of hydrogen gas. This hydrogen gas gradually relieves the vacuum of the can and then forms sufficient pressure to bulge the ends. When this pressure is slight, so that the ends may be pressed in by the fingers, the can is commonly called a springer. When the pressure becomes greater, so that the ends cannot be pressed in, the can is often called a hydrogen swell. These springers and hydrogen swells must be sharply distinguished from swells caused by decomposition. The former are due entirely, as stated above, to hydrogen gas formed by the action of the contents on the tin and iron of the can. The contents are normal in appearance (except for more or less bleaching action on the colour) and flavour. The contents are sterile.

Springers and hydrogen swells are not regarded as merchantable, because bulged ends may well be taken as a warning sign, and consumers will not distinguish between bulging due to hydrogen gas and that due to decomposition. The difference between hydrogen swells and swells caused by spoilage is emphasised to point out the fact that widely different methods must be employed to prevent them.

Investigations of recent years have demonstrated that it is not the fruit acids alone that cause the perforation of cans or the formation of springers and hydrogen swells. The acidity of a product is not by any means a measure of the extent to which it will attack the tin and iron of the can. Pineapples and grapefruit, for example, may be held for long periods in proper storage and have only a slight tendency to form springers. On the other hand, strawberries and other red fruits which have a lower acidity have a pronounced tendency in this direction. The difference is due to the red colouring matter of certain fruits, which belongs to a class of compounds known as anthocyans and which contains oxygen so loosely combined that it is given up readily and thus accelerates corrosion.

In the same way, atmospheric oxygen, when present, accelerates corrosion. A slack-filled can of fruit will corrode to a greater extent than one that is well filled. In a can that is sealed with such a degree of tightness that micro-organisms are excluded but it is possible for air to pass through the gasket (this has sometimes occurred, especially with paper gasket closures), corrosion occurs to a greater extent than when a can is tight, and perforations and springers occur at an earlier date. This difficulty, with respect to atmospheric oxygen, is largely overcome by technological methods. Canners have learned better the importance of sealing their cans tight. With some products the paper gasket has been superseded by compound at the canner's end of the can. Owing to special manufacturing conditions, the can maker may be able to use a paper gasket on the end closed by him, although such gaskets are not suitable for use on the canner's end in packing certain products.

Storage Temperature of Canned Foods

While storage is discussed under technological operations, some mention of it is appropriate in this connection. The slight solvent effect which canned foods exert on the tin and iron of the can is accelerated by the presence of atmospheric oxygen and of loosely combined oxygen. If cans are sealed with such a degree of tightness (especially when paper gaskets are employed) that micro-organisms are excluded but air may pass through the seams, the solvent action of the contents is increased as well as the tendency of the cans to form springers and to perforate. Since this is a chemical action it is influenced by the storage temperature.

Considerable experimental work has been done on this subject. For example, a lot of loganberries, canned on July 2, 1924, was divided into four portions which were stored at different temperatures. The cans stored at 97° F. were all either perforated or bulged by the beginning of the following April, ten months after packing. Of those stored at 70° F., about 18 per cent. had formed perforations and springers by the following April, and nearly 77 per cent. by the beginning of March, 1926, about twenty-three months after canning. Of the cans stored at 50° F., all were in merchantable condition at the end of the year. Over 35 per cent. of them had perforated or formed springers by the beginning of March,

(*Continued on page 261.*)

Science and Confectionery

The following is a report of a portion of the address given by Mr. S. M. Gluckstein, a director of Messrs. J. Lyons and Co., Ltd., on October 19, 1927, to the London and South-Eastern Counties Section of the Institute of Chemistry.

AS I have already mentioned, I consider the first function of science in business to be the control and standardisation of methods in manufacture. Here it is essentially that section of science which comes under our laboratory that is most closely concerned, and we now have a complete system of control and standardisation in certain lines which my firm manufactures, and the list of such controlled lines is being added to daily. Probably the most outstanding example which I can quote is that of ice-cream manufacture, in which from the reception of the raw materials, through every stage of the process, to the final frozen article, the laboratory has control.

Successful manufacture demands standardisation, not only from the point of view of the margin of profit, but also from the point of view of pleasing the public taste; for the public likes to know what it is going to receive, and when it buys our ice-cream it wants that ice-cream to be the same, day in, day out, and not to be up in quality one day and down the next; and in the case of ice-cream this could only be achieved by regulating to within near limits the amount of fat, of sugar, of milk solids, and of flavouring matter which go to form the final article, and also the temperatures of pasteurisation, the temperatures and times of ripening, the amount of over-run, and the amount of freezing which the product finally receives. In this connection I may say that we also have a full bacteriological control of every part of the process.

Cocoa and Chocolate

The control of cocoa and chocolate products is obviously one which calls for chemical and physical work, and only rarely for bacteriological work. Moreover, as cocoa and chocolate move more slowly through the factory, there is not the same need for "rush" control as there is in the case of ice-cream.

As must be known by many of you, control in chocolate takes the form of ordinary determinations of cocoa butter and sugar with butter fat and milk solids-not-fat in the case of milk chocolate. This is the pure chemical side of the examination, but a most important factor—namely, the smoothness as indicated by the general form and size of the particles, is of paramount importance.

Under our control, samples are taken ex melangeurs, ex refiners, and ex conche, and you will, therefore, appreciate that in this way we obtain not only an idea as to the efficiency with which the factory staff make the mixture of the various materials, but also the efficiency of the machines themselves.

The testing of cocoa cakes from the presses is also most important, from a purely commercial point of view, in order to see that a pre-determined standard amount of cocoa butter is left in the cocoa cake.

These are examples where the laboratory has complete control. There are several other departments where at present it has only a limited control, such as in bread baking, cake baking, and several other bakery products.

I have little or no doubt that in the near future these departments also will become completely controlled, and I think that the only reason that such is not the case at present is owing to the physical inability of the laboratory—on account of restricted space—to take on this extra work.

My second group was the improvement of existing methods of manufacture and production, and here we get examples of the very great necessity there is for close co-operation between the various branches of our scientific organisation.

Coffee Essence

In this connection I do not think I can do better than instance our coffee essence manufacture. Four years ago Lyons were playing at making a coffee essence. The matter was referred to the laboratory, and after considerable experimentation they developed on a laboratory scale what they considered to be a much improved method of producing coffee essence, and the question at once arose as to how to translate into factory plant the laboratory apparatus. The chemist knew what he wanted and how he wanted to get it, and consequently, in co-operation with the engineer, the plant was devised which embraced those points considered necessary by the chemist, and the result was success. But even at this stage the tale is not finished—a large number of extractors have been required to cope with the increased trade, and in practically every instance where new plant is required, the chemist and the engineer have foregathered to improve on the type of plant to be constructed.

Other Products

These are only two examples of many which I could give of the practical value and necessity of the laboratory in such a business as ours. The variety of the work undertaken may be gauged by a few further examples of special investigations made by the laboratories, such as work on the corrosion of pipes, and on water softening—undertaken in conjunction with our engineering department. Work on gelatines—for us a most difficult product to get standardised. Work on flour blending, treatment of waste products, dealing with customers' complaints, collaboration with our export committee on products and packing for different climates, the testing of all kinds of special plant put forward by various firms for manufacturing purposes in the factory, or for use in our other various establishments, to say nothing of the work involved in obtaining absolute standardisation

(*Continued on page 272.*)

Modern Cereal Chemistry

The following is a review of the second edition of Dr. Kent-Jones' book, "Modern Cereal Chemistry"; *446 pp.; 25s.; The Northern Publishing Co., Ltd., Liverpool,* 1927.

THE FLOUR-MILLING industry of this country is one of its most important food manufactures: the average annual output of flour in the British Isles is about 4,500,000 tons, with an annual value, taking present prices, of rather over £64,000,000.

It is therefore very surprising to find that during the past thirty years, only *three* textbooks dealing with the scientific aspects of flour-milling have been published in the English language, including the first edition of the work now under review, published in 1925. That first edition was sold out in a little over a year, and of the second edition already over 300 copies have been sold: as the number of trained chemists employed by the flour-milling industry in this country is very small—probably not more than about twenty at the present moment, though there are perhaps as many more people carrying out routine testing of various kinds in flour-mills—it is evident that by far the greater number of copies of this work are not in the hands of chemists employed directly in flour-mills, but of persons who take a keen interest in the scientific developments in the industry, a fact which provides a definite proof of the increase in the attention which has been devoted to the scientific side of flour-milling in recent years. Until about twenty years ago the chemistry of wheat and flour was an almost unexplored field, as is shown by the consideration that of the 220 papers—certainly not all entirely dealing with this branch of chemistry—mentioned in the bibliography to Dr. Kent-Jones' work, only about sixty were published before 1915.

The author, whose name is a household word among flour-millers in this country, has probably done more than any other individual to stimulate interest in scientific work in the milling trade: he is to be congratulated on having published such an extraordinarily complete résumé of the scientific work which has been done on wheat and flour right up to the present moment.

The chapters on the various properties of different wheats, on the chemistry and analysis of wheat, flour and milling products generally, on "strength" and the colloidal chemistry of flour and on the chemistry of the baking process, provide a detailed cyclopædia of our present knowledge to the chemist taking up the study of flour-milling, for whom the book is primarily intended: but non-technical people—millers, bakers, and laymen generally—will take great interest in the chapters on the nutritive values of different types of bread, and on bleaching and flour improvers, to take two subjects which have lately been very much before the public. One aspect of the controversy over the comparative nutritive values of white and brown breads needs more emphasis than it generally receives. The miller enjoys what is known in journalistic circles as a "bad press"; the self-appointed authorities on dietetics who declaim in the newspapers against the alleged unwholesomeness of white bread seem to assume that millers are guilty of trying to foist white flour upon a reluctant public because it is to the millers' interest to do so, and that they wilfully ignore the question of what may be best for the public health. This is pure nonsense; the miller has very little voice in the matter, all that he does being to supply what the public demands, and the public knows perfectly well what it wants. Both white and brown bread are always equally available, and it is significant that the best-informed authorities state that the consumption in this country of brown bread of various kinds amounts to less than 5 per cent. of the total bread consumption.

The chapter on the nutritive value of bread should be read with great care by everyone interested in the matter: the impartial way in which Dr. Kent-Jones sets out the evidence for and against white and brown bread is admirable.

As to bleaching and flour improvers (Chapter IX)—a subject which has recently been very much to the fore since the publication of the report of the Departmental Committee appointed by the Ministry of Health to inquire into this subject—one may be content to quote Dr. Kent-Jones, that "most interested persons are thankful for, and, in the main, are prepared to accept the report, which has assisted in settling a vexed question and which should help to alleviate the public mind." This committee has thoroughly investigated the subject in an inquiry lasting over two years, and although their final report was issued early this year, up to the moment no legislation has been issued based on their recommendations. Even in the case of one or two well-known flour improvers which the committee viewed with some suspicion, their suggested prohibition was, as the author points out, more in the nature of a precautionary measure than a verdict based on definite physiological information, and their opinion was based entirely on possibilities, admittedly remote and unsubstantiated, which might occur. It must be borne in mind that these processes of improving flour cost money to the miller and give him no direct financial return: all that improvers enable a miller to do is to enhance that indefinable something called "quality" which appeals to the baker and therefore helps the miller better to meet the fierce competition which nowadays exists. Further, the use of improvers renders it possible to use in increased proportion some wheats, such as English wheat, which are not by themselves of a quality suitable for bread-making; their use, therefore, is an economic necessity in the national interest, a point of which the importance must be particularly stressed. In brief, it is the baker and the community at large who reap the benefits of flour "treatment."

Chapter X. on conditioning and the effect of heat is worth careful reading as being the most important

contribution to our knowledge of what happens during the conditioning of wheat—a process of paramount importance to millers—which has yet appeared.

The portion dealing with the effects of high temperatures on wheat and flour is particularly valuable. Some of these effects have been known for a good many years, but Dr. Kent-Jones has succeeded, as a result of very detailed examination of the matter, in devising a process for the improvement of wheats and flours by physical as opposed to chemical means, a process which, in the event of so-called chemical improvers being banned by legislation, will be valuable as offering at any rate a partial substitute. For this reason, the matter has recently attracted much attention in the milling trade.

Probably the chapter on "Strength and the Colloidal Chemistry of Flour" is the one to which millers and flour-mill chemists will first turn, as the whole subject is very difficult and obscure, both from the psychological and physico-chemical points of view. The pronouncements of bakers on this subject will be found as divergent as they are dogmatic: the state of mind of the average miller is curiously nebulous, as necessarily must be the case since he is dependent on the reports of bakers for his conception of the subject; and the case of the chemist, looking to the miller and baker for some precise definition on what is after all a matter of paramount importance to all three, is indeed deplorable. It is therefore not at all remarkable to find that in the scientific literature of the subject there is no generally accepted definition of a property of wheats and flours which has puzzled investigators for over a hundred years, and on which an enormous amount of time and labour has been spent; a paradoxical state of affairs which accounts for the abortive results of the greater part of such research work.

A chemist taking up employment with flour-millers will inevitably be confronted with the extraordinary difficulty of discovering what it is that the miller wants him to find out, and this question of "strength" is a typical instance of the kind of problem which awaits him. He will be grateful to Dr. Kent-Jones for the very complete summary of modern views on this subject which this chapter provides.

One meets with statements here and there in the book which will hardly bear criticism.

For instance, it is stated on page 26 that it is probable that the use of modern conditioners enables the miller to produce the necessary diastatic activity in wheats, but on page 267 this is contradicted. Here we find that "there is not much evidence of important chemical changes occurring during the process of even warm conditioning." Other workers will be in entire agreement with this latter statement.

As regards the presence of fat in wheat and its products, we find on page 12 that "the percentage of fat in commercial flours is rarely above 0·6 per cent., while on page 212, in an exhaustive series of analyses of various flours, the figure for fat content is in nearly all cases from 1 to 2 per cent. On page 345 it is stated that "if flour be dried before fat extraction, the fat content will be found to be about half that obtained on the undried flour." This general statement cannot be substantiated. The reduction in fat content mentioned is due to heating, and not to mere drying, as confirmed by recent work by C. W. Herd.

The rather positive opinion expressed with regard to the presence and possible effects of proteolytic enzymes during panary fermentation is hardly justified by the present state of our knowledge. On pages 193 and 200 it is definitely suggested that yeast may have a marked proteolytic effect in dough fermentation. It is difficult to see how this can occur, as the protease of yeast does not pass through the cell membrane (as Bayliss has shown), while the gluten proteins, being insoluble, can hardly pass into the cell. It seems to the present reviewer that the author, in common with many American workers, too easily assumes that the reduction of the viscosity of flour-water suspensions on standing is definitely due to the action of proteolytic enzymes; the action of phytase, which is well known to occur in wheat flours, would have the same effect, and the whole question of the meaning of this viscosity phenomenon as bearing on the "ripening" of dough needs much more investigation.

On page 243 it is stated that the value of acid calcium phosphate as a flour improver depends on the well-known reaction occurring in the yeast-cell by which hexose-phosphates are being continually formed and broken down. Harden, however, expressly states that phosphates are without any action on fermentation by yeast cells, and it therefore seems more probable that the action of acid phosphate is concerned with the colloidal state of the gluten proteins.

Recently, the author, in collaboration with C. W. Herd, has devised a method for determining the colour of flours. As part of the method the pigment from the branny matter present is said to be extracted by alkaline methyl alcohol. The reviewer finds, however, that the latter reagent does not extract the red-brown pigment to which the colour of red bran is due, and which is extraordinarily difficult to extract: what this reagent does dissolve out is a flavone which follows a very general rule in being much more richly present in offal—germ in particular—than in the pure endosperm. This flavone is also present in about equal quantity in both red and white brans, so that the method does not show the marked difference in colour between, say, lower grade flours from red and white wheats. The method is therefore not an accurate *general* method of measuring the colour of flour, though useful as determining what the miller terms the "grade" of flour. The process, as described, is unnecessarily long and cumbrous, and can be much simplified in practice.

In conclusion, the book may be left with the assurance that in the hands of the flour-mill chemist it may be allowed to take care of itself; but to all interested in milling in all its aspects it will be appreciated as a compendium of scientific and technical information. It is written in an easy and lucid style, is well arranged according to subjects, and is furnished with full indexes and bibliography.

A. G. SIMPSON, M.A. (Camb.).

The Efficiency of Fuels

By "M.I.M.E."

The first part of this article, which discusses the factors contributing to the efficient use of fuels in boiler-practice, was published in the December issue. As we mentioned in last month's editorial, a scientific analysis of the steam-raising plants attached to food factories would, in very many cases, yield some startling results and would reveal more than one source of financial loss; a critical examination of the power plants of a number of American meat factories, recently carried out, has resulted in the saving of many thousands of pounds a year. These two articles will help the manufacturer to appreciate the value of scientific control as applied to steam-raising and boiler-practice generally. In future issues we shall deal with some important questions relating to the utilisation of electrical power and of power transmission in food factories.

PART II

A DETAILED survey of the sources of loss will bring to light some astonishing facts, for it must be remembered that such losses are cumulative, and they may represent very considerable sums of hard cash during, say, a year's operations.

As a matter of convenience, it is proposed to subdivide our survey under these following headings: 1, influence of ash; 2, influence of moisture in coal; 3, influence of size of coal; 4, influence of air supply; 5, influence of frequency of firing; 6, loss on account of smoke; 7, loss on account of carbon dioxide; 8, loss on account of excess of air.

Ash

The thermal efficiency of coal is very adversely affected by the presence of ash, and the losses occasioned may be regarded as three-fold in their incidence. Ash indicates the presence of incombustible matter, and the ash a coal contains, having been purchased at the same price as the combustible portion of the coal, represents a direct source of loss. There is an undeviating ratio between the loss of fixed carbon and the percentage of ash, for the presence of this incombustible matter is the measure of the loss sustained through (i) the amount of unconsumed carbon it may contain; (ii) the loss of heat when ashes are removed in a hot condition; and (iii) the loss determined by the influence of the ash in choking the fire and obstructing the progress of free combustion.

Viewed from another standpoint—namely, the commercial as in contrast with the engineering, the presence of ash represents an expensive adulteration. There is a proportional increase in the cost of freight and handling per heat unit obtained, and there are, also, the expenses incidental to the removal and transport of ash. If you take the trouble to cost up carefully these two items of unproductive expenditure, you will probably be astonished at the magnitude of the loss they represent.

In considering the percentage of carbon which eventually forms part of the ash, we light upon a source of loss amenable, to some extent, to skill in manipulating the fire. Carbon may be lost either in the form of clinker or ash, or else as decrepitated coal. The knowledge demanded of the fuel engineer, in modifying this source of loss, can only be appreciated when we recognise the pitfalls an unwary fireman will encounter. The approved method of saving carbon in ash, or decrepitated coal, involves slow and gentle firing, and the admittance of more air. But it is obvious that, if the attempt to effect economy on these lines is carried too far, the efficiency is liable to be lowered rather than raised. There is a great variation in the amount of carbon in ash, and the only safe figure to propose is a very broad one. The range is between 10 and 60 per cent., and the loss by carbon in ash is dependent upon the percentage of ash in the coal.

One or two concrete examples will serve to emphasise the influence of ash in a manner more effective than scores of words. Let us suppose the percentage of carbon in a sample of ash amounts to, say, 20 per cent., whilst the amount of ash in the original coal amounted to, say, 12 per cent. The loss of fixed carbon, on account of carbon in the ash, will in the example cited amount to 3·65 per cent. A bad, though not infrequent case, might involve these following figures: 50 per cent. of carbon in ash, 15 per cent. of ash in coal fired; loss, 18·98. And so on, and so forth. It is clear that, the greater the quantity of hot ashes resulting from the combustion of a given amount of coal, the greater must be the loss of heat when the ash is removed. Ash clogs the grate, prevents free combustion, and calls for extra work on the part of the fireman. And, when this operative is extra busy, it means that an excess of air gains admittance when the doors are opened.

Moisture in Coal

In moisture we have a factor which bears an important influence on the theoretical heat value of a sample of coal. Apart from the fact that no one desires to purchase water at the rates ruling for coals, it is certain that whatever moisture may be present in the coal has to be raised to 212° F., evaporated into steam and the steam raised to the temperature of the escaping gases. The percentage of moisture in various coals depends upon the character of the coal, its temperature, and the exposure to which it has been subjected. As a rule, we find from 1 to 5 per cent., but in bad cases this quantity may be multiplied many times, and will certainly involve serious losses.

If one sample of coal showed, on analysis, 80 per

cent. carbon, 15 per cent. ash, and 5 per cent. moisture, and another sample assayed at 80 per cent. carbon, 5 per cent. ash, and 15 per cent. moisture, the calorific value of these two samples would be the same in theory. They would both possess a theoretical calorific value of 11,720 B.Th.U., because this value is directly dependent upon the amount of carbon. But, in practice, these two samples differ in efficiency. The available heat in the first case, neglecting losses not due to moisture, would be 10,600 B.Th.U., whilst, in the second instance, it would be 10,488 B.Th.U., if we assume the waste gases escape at 500° F.

Another way of illustrating the loss due to moisture may appeal more forcibly. Let us postulate that (i) no one would willingly pay forty shillings a ton for water, and (ii) the presence of moisture in coal is uneconomical, because the moisture has to be converted into steam, and rejected at the temperature of the furnace gases—a total loss of heat. The conversion of one pound of water at ordinary temperature into steam at the temperature of the waste gases, say, 460° F., will require approximately some 1,200 B.Th.U. An average moisture content of coal may be something between 1 and 5 per cent., whilst slack and small coal will usually contain up to 12 per cent. of water. Thus, the average heat loss ranges between 12 and 144 B.Th.U. per pound of fuel, according to the moisture content of the sample under assay. It is rather an expensive proposition.

Size of Coal

The efficiency of coals is influenced by the size of their respective pieces. This influence varies with type, and whilst it is more pronounced in the case of anthracites, it still remains of great importance in every instance, under certain conditions. If this were not the case, there would be no screening at the pit-head, and no scales in specified sizes. A free-burning fuel is a fuel composed of pieces or particles of even size, and there is no occasion for me to remind practical men of the troubles associated with slack, screenings or culm, the inherent dust and minute particles of such fuels rendering them difficult to burn, unless they are mixed up with easy-firing bituminous coal and burned upon specially well-designed grates. In any event, it is due primarily to the great house of Sturtevant that such fuel can be economically used at all, for it demands an intensity of draught which can only be produced at reasonable cost by mechanical means. The finer the coal, the more draught is wanted for its complete combustion; but I will add that it is both undesirable and uneconomical, as a general proposition, to mix the size of coals.

If you decide to use small-sized coal you will be well advised to study the conditions governing success in this matter. They are simple, common-sense rules, formulated some years ago by an engineer who closely studied the subject, more especially in connection with small anthracites. The first necessity is mechanical draught, and I think experience has taught us that such draught is preferably applied beneath the grate; whilst we always employ an ample grate area, in firing under these conditions. The construction of the grate involves a plain surface, as by this means we prevent lodgement of the small coal, and it also involves the adoption of a design permitting the ready removal of ash and clinker. With regard to air spaces, when coal passing through a nine-sixteenth perforation is used, the space would be one-quarter inch wide. Another important factor is to provide for thin fires and frequent firing, without excessive opening of doors. The thickness of the bed should diminish with the rate of combustion, and a reduction of draught above the fire, as the rate of combustion decreases, is also advisable.

A good deal of research has been done on these questions of the mechanical adjustments necessary with coal of various sizes. It may all be summarised in this statement: The temperature developed by burning of the smaller coals decreases with the size of the coal. This involves a larger heating surface in the boiler, in order to develop the same horse-power. In other words, if you are burning coal, say, one inch mesh, and obtaining one horse-power for every nine square feet of heating surface, you will probably require about 25 per cent. more heating surface if you are burning three-sixteenth coal, even though you may be evaporating practically the same amount of water per pound of coal.

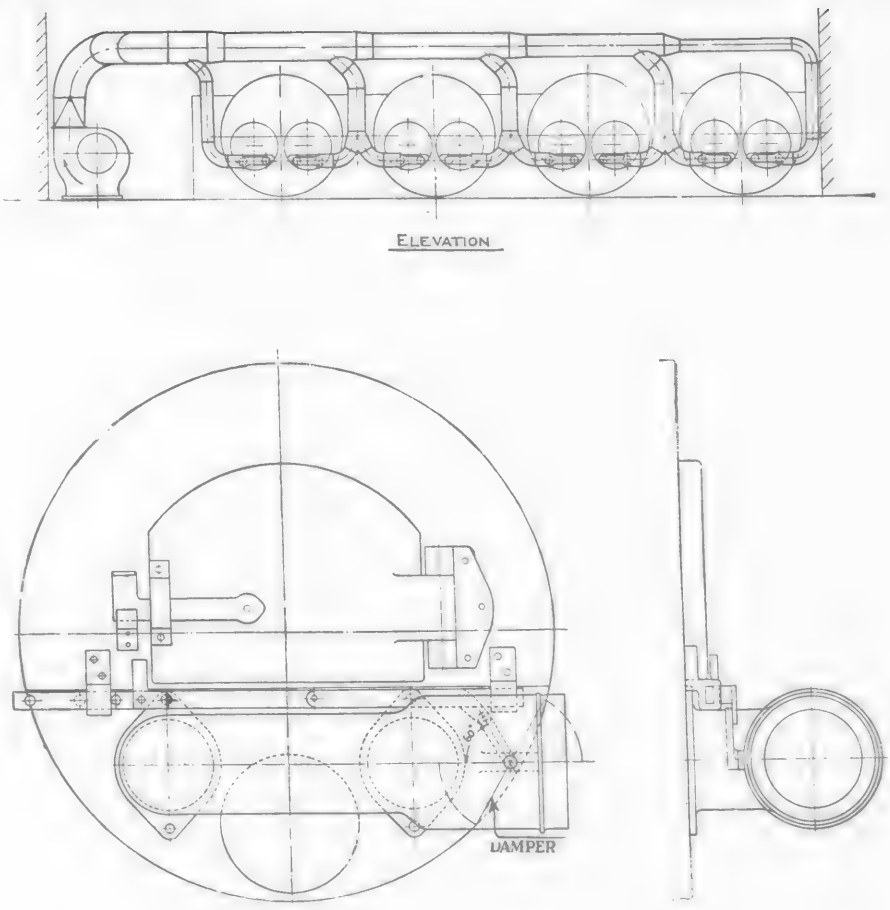
Air Supply

The first point is that, in theory, loss or waste occurring through excess of air supply is not properly chargeable to the fuel. But, in fact, this factor exerts an important influence upon the relative efficiency of fuels. It is here that we come upon the question of natural *versus* mechanical draught, and every engineer knows Hutton's verdict on this question. "A considerable saving of fuel," says this authority, "may be effected by the employment of well-arranged forced draught, and greater power may be obtained with less size and number of boilers than with boilers having combustion with natural draught." I do not know that Hutton's opinion has ever been seriously challenged.

The quantity of air passing through a fire with chimney draught is liable to changes regulated by atmospheric conditions and methods of firing and operating the dampers. This implies the necessity for special skill and care, if we are to secure uniformity and equality of air volume. It is only in plants operated by mechanical draught that such uniformity can be effectively controlled and maintained.

This subject is of such paramount interest that it will, possibly, be appreciated if we include a definite calculation of the amount of air necessary for the combustion of a coal of definite analysis. I will, therefore, base this calculation upon the requirements of a coal with the following composition, giving these proportionate values in pounds, instead of in percentages, for our easier understanding:

Carbon	80·0	pounds
Hydrogen	5·0	,,
Oxygen	2·7	,,
Nitrogen	1·1	,,
Sulphur	1·2	,,
Ash	8·3	,,



Arrangement of Forced Draught Plant and detail of Inlet Pipe and Door Locking Gear.

The nitrogen in this coal is inert, and as there is only 1·2 pound of sulphur, we may disregard this constituent. Ash, being incombustible, has no effect upon the result in so far as the chemical requirements are concerned.

The 2·7 pounds of oxygen will render inert $\frac{2 \cdot 7}{8}$ = 0·3375 pound of hydrogen, since it will combine directly with that amount. The constituents to be considered will, therefore, become:

Carbon ...	80·0	pounds
Hydrogen	5·0 − 0·3375 = 4·6625	,,
	84·6625	,,

and their requirements in the way of oxygen will be

Carbon ...	80	× $2\frac{3}{4}$ = 213·33	pounds
Hydrogen ...	4·6625 × 8	= 37·30	,,
		250·63	,,

The weight of air containing this quantity is:

$$\frac{250 \cdot 63}{0 \cdot 236} = 1061 \cdot 57 \text{ pounds.}$$

The quantity required per pound of combustible will, therefore, be:

$$\frac{1061 \cdot 57}{84 \cdot 6625} = 12 \cdot 54 \text{ pounds.}$$

(*Continued on page* 261.)

Food Factory Costing

By CHARLES E. SEARLE

In the first two articles were discussed some of the issues that arise on introducing a costing system into a food factory. It was pointed out that the costing office could satisfactorily deal with statistics and also with much general and necessary information not always of value to the firm's accountants, but sometimes of more value to the works and sales managers. Every firm has naturally some costing or estimating system, and where accurate figures are in the hands of, say, the company's secretary, and it is not thought desirable to pass details on to the costing department, the latter would, of course, accept these figures, taking no responsibility for their accuracy. In this final article I will deal briefly with goods outwards from departments and touch on certain aspects of sales management which come within the scope either of costing or of statistical records.

PART III

Manufactured Goods

WITH REGARD to manufactured goods, this time we will start at their final resting place on the firm —namely, the order assembly-room.

The assembly usually receives a numbered order, either working from prepared sheets or from the original customer's or traveller's order. The assembly-room is a stock-room in itself, with its bin-cards in use as in the general store; the goods required are taken from the stock, and the quantity and order number duly entered.

When the stock reaches a certain minimum, which is stated at the top of the bin-card, the man in charge requisitions, if possible, a complete batch (as originally manufactured), and receives these with a transfer note from the store-keeper, the goods then being duly entered on the inwards side of the bin-card and the stock-in-hand recorded. The labelling-room can be missed generally, as far as booking is concerned, and in some cases is considered a part of the assembly-room and in others as a part of the manufactured stores. On the transfers from the stores to the dispatch the batch number is shown, and this also is entered on the bin-card. When goods have been manufactured, they are transferred from the manufacturing department, giving this batch number.

So now we have our information complete; if we are costing departments we know exactly what was requisitioned, and we can trace the articles right through the dispatch to their final exit from the firm, and in the case of complaints, we can give details of date of manufacture, ingredients used, who supplied the ingredients, and also other information rather outside the scope of this article, such as time of cooking and sterilising (if we have an efficient system of recording-thermometers). The goods may go through many departments, such as tin cleaning, lacquering, and so on, but we can trace them all the way by means of our batch number; this number is also often shown as a code number stamped on the covers of the articles themselves. On the other hand, certain goods—sausages, cooked meats not in tins and glass—will not go into the general stores, the order assembly-room being treated as the general stock-room in this case. However, generally speaking, when goods have left the manufacturing department and entered the stock-room, the costing office takes no further interest in them, except under the heading of "sales," "travellers," etc., and they are then entered to the credit of the manufacturing departments.

Breakages and waste in the final departments are often charged, not to the stock-rooms, labelling-rooms, etc., but to the original manufacturing department, sometimes to the annoyance of the foreman concerned.

Every factory will have its own particular difficulties to deal with, and these can only be dealt with by co-operation between the costing clerk and the various departmental managers, each doing his best and trying to see the difficulties of the other.

Additional Costs

However, when goods have left the assembly-room and gone to the dispatch, the cost of placing them on the market is not by any means finished with. We have to keep records of carriage, motor driver's records, mileage, petrol used (differentiating between goods inwards and outwards), oil used, motor repairs, etc., though, generally speaking, these are a cost on sales. It is evident that here we are dealing with overhead charges, as one van-load or box for rail may contain goods from every manufacturing department on the firm, and to calculate the cost to each department would be almost impossible.

Sales Department

Sales management nowadays is a much more complicated matter than it was before the days of excessive competition, and has necessitated very careful statistical records of costs, etc. Where the sales manager has not a clerical staff of his own, he may look to the costing office to supply him with all sorts of information as to the costs of his departments, especially as it may happen that a representative who is otherwise doing well may be an absolute failure and loss to the firm, because he is too expensive or sells only non-remunerative goods.

It is a fact of some importance to note that some of the leading firms of food manufacturers have more or less regretfully had to part with old and experienced travellers since the war, because they

could not conform to the new order of things, and have had to bring in men more amenable to authority. A commercial traveller, after all, is an employee of the firm, and often is of less value to the firm than the manufacturing foreman, though he would probably not like to be told so.

One leading firm boasts, with a certain amount of truth, that they can, almost to a certainty, state in what street their representative is at a particular moment, especially in a large town.

Such matters as the return of sales for each traveller are quite obvious, but some firms insist on very full details as to what a traveller is doing and what he is costing the firm; this is even made rather a burden to the representatives, as they often have to spend several hours making up returns for use as statistics, and even if the time so spent could not be utilised in taking orders, it is absorbing their health and energy. Travellers have to send daily records of mileage covered, garage costs, petrol and oil used, speedometer at beginning and close of day, records of sales made, number of orders taken, new accounts opened, old firms not visited (and why?), accounts lost (and why?), and so on. There is also the always difficult question of dealing with agents, who, being independent, cannot be expected to supply too many details, and so one scarcely knows what is being lost on a certain ground and what extra trade could be done with a whole-time representative.

All this information comes into the firm, and is duly tabulated, and such items as are actual costs are put under suitable headings. Records for van salesmen, if any, have to be kept, also mileages and petrol compared. One car with which the writer had to deal was a very expensive luxury on account of the oil required. To mention this casually to the managing director may have no effect, but to put clear and accurate figures before him is almost sure to attract attention. It is a troublesome and difficult job to get all these matters in proper tabulated form, but a much more simple matter to keep going when once their value is understood.

Final Remarks

In conclusion, having got all our information together in a systematic way, and clearly recorded, not hidden under letters or figures which mean nothing to anyone but the costing clerk, we then call in the accountants, place the whole matter before them, and ask for their advice and assistance. They are requested to point out the weaknesses and show how to rectify them; also how to co-ordinate the system into a living whole; but the writer respectfully submits that to ask any firm of accountants to come in and organise costing before the factory has been brought into a complete system of organisation is asking them to undertake more than can be expected, as they cannot follow the remarkable movements and cross movements of goods, etc., in a food factory; only years of close application can do this.

One more thought on this subject. Having got our costs, let us be careful not to jump to hasty conclusions. First we should consider: Is the fault, if any, due to the management? is it due to the foreman? or is it due to the employee or actual worker? The writer had at different times to deal with four firms—all firms of importance and all grumbling about heavy labour costs. In each case he was able to point out at least one defect, which was purely a matter of management.

A large bakery and pastry factory sending goods by rail, etc., was one case. Here the employees had to carry tray after tray, and load after load, of cakes and pastry from one department to another, where a simple trolley or conveyor system would have saved hundreds of journeys a day.

Another, a sauce factory, was making sauce on the level or floor on which it was being filled and labelled; consequently, it had either to be carried in pails or turned into wheeled tanks, and then lifted up to the sauce-filling machine, a dirty and unpleasant job, and this firm had a very suitable floor above where the sauce could have been made and run down in a clean and hygienic manner through suitable piping to the filling machine.

Another was a North Country firm doing a large passenger train trade, and the despatch staff were running wild all over the firm collecting the goods, instead of the goods coming to them, as could be easily arranged in large quantities and in a systematic manner.

Another was a large sauce firm, and the sauce was being pulled, box by box, through a tunnel, two men at each end, and filled in one department and labelled in another. Space does not permit of an explanation of this very elaborate process, which was a survival of times when labour and ingredients were cheap.

The writer was able to show how, by a simple method of pumping, the sauce, which one man could attend to in place of the six required, could be filled, stoppered, capsuled, labelled, packed into cartons, and nailed down for despatch, all along one continuous table, and with one continuous operation. All these four firms were complaining about the heavy cost of labour.

Since writing these articles, a firm has written to say they propose to try costing out in "one or two" departments; this, in the writer's opinion, can only lead to failure. So complicated are the movements in a food factory that unless the costing department can deal with every case that comes before it, many movements of goods and labour will be lost sight of.

Labour may be transferred from a department which has no costing system to one which has. The lending foreman takes no interest, and the borrowing foreman, naturally, wants to show a profit, particularly if he is working on a bonus system. The same also applies to goods transferred.

Condensed Milk Merger

An arrangement has been made to amalgamate the interests of the Nestlé and Anglo-Swiss Condensed Milk Company (South Africa) and the South African Condensed Milk Company at Donnybrook, Natal. This company expects to produce all the condensed milk used in South Africa. In 1926 the imports of condensed milk were valued at about £300,000.

Determination of Sulphur Dioxide

Abstracts of Papers Read before the Society of Public Analysts on January 11th, 1928.

Determination of small quantities of Benzoic Acid and Cinnamic Acid, with some Notes on the Colorimetric Determination of Salicylic Acid. By J. R. Nicholls, B.Sc., F.I.C.

A colorimetric method of determining benzoic acid is based on its partial oxidation, in a constant proportion, to salicylic acid by means of hydrogen peroxide in the presence of ferric chloride, and colorimetric determination of the salicylic acid under specified conditions. Cinnamic acid may be determined by first oxidising quantitatively to benzoic.

Report of the Preservatives Determination Committee of the Chemists of the Manufacturing Confectioners' Alliance and of the Food Manufacturers' Federation, on the Determination of Sulphur Dioxide in Foods. By L. E. Campbell, M.Sc., F.I.C.

A normal procedure and an apparatus for the determination of sulphur dioxide in foods have been devised, and details of standard volumetric and gravimetric determinations are given, together with details of the treatment required in certain special cases, such as starch, gelatin, meats, dried fruits, etc.

Notes on the Effect of other Reducing Substances on the Determination of SO_2. By J. W. Black, B.Sc., A.I.C., and B. J. W. Warren, F.I.C.

In some cases—*e.g.*, glucose and gelatin—the interference of other reducing substances is negligible, but in others (nutmeg, mustard, ginger, etc.) it is considerable, and a time limit must therefore be set to the distillation period. The behaviour of different substances was shown by means of curves.

Rapid Estimations of Sulphites by Alkaline Liberation, or Extraction, and Titration. By H. R. Jensen, M.Sc., F.I.C.

The sulphite content of certain products such as glucose syrup and cornflour may be satisfactorily determined by direct extraction followed by titration with iodine. Details of the procedure were given.

Barium Sulphate Losses in Gravimetric Estimations. By H. R. Jensen, M.Sc., F.I.C.

A series of tests was made to determine the amount of loss within the optimum range of acidity for the precipitation of barium sulphate. Too low acid concentration favours adsorption of barium chloride; hence it is desirable to add the reagent in a very fine jet, and to have an excess to reduce the solubility of barium sulphate and the adsorption of alkaline sulphate.

Determination of Sulphur Dioxide in Sausages. By Osman Jones, F.I.C.

On the addition of sulphite to sausages there is an immediate loss of sulphur dioxide, so that the amount found is invariably lower than that added. The best conditions for the determination of sulphur dioxide are given. A method of vacuum distillation is described, and is shown to give results agreeing well with those of the Committee's standard method.

Note on the Oxidation of Sulphites by Air. By H. M. Mason, M.Sc., F.I.C., and G. Walsh.

Carbon dioxide must be quite free from oxygen if used in a lengthy sulphite distillation. Removal of the adsorbed air from the foodstuff by the use of a vacuum before the heating will prevent oxidation losses, but good results are also obtained by extremely rapid heating and distillation.

Note on the Titration of Dilute Sulphite Solutions with Standard Iodine Solutions. By H. M. Mason, M.Sc., F.I.C.

It is shown that the low results obtained when sulphite solutions are titrated with iodine are due to oxidation and to the escape of sulphur dioxide set free by the hydriodic acid formed during the titration, the latter being responsible for 70 per cent. of the loss.

Determination of Sulphur Dioxide in Fatty Substances. By A. W. Knapp, B.Sc., F.I.C., and R. J. Phillips, F.I.C.

The influence of fats (fresh and rancid) on the volumetric determination of SO_2 is dealt with. In rancid fats free from sulphur dioxide volumetric determinations show an apparent content of SO_2. Hence, only the gravimetric process should be used in such cases.

(*Continued from page 264.*)

of our better-known products, such as bread, cake, tea, coffee, etc.

The economic effect of these functions on the financial side of the business should be very great. The firm should, by the aid of the chemist, be in a position to give the public better value and a standardised set of lines, which must inevitably reflect on the sales, and increased sales always mean increased profits.

Milk Powder

Again, some years ago we commenced making dried milk on a spray process system, and we were dissatisfied in a general way with the keeping properties of full-cream milk powder.

The powder when freshly made is admirable—and yet a gradual deterioration takes place in the flavour. A large number of experiments were carried out to try and find the reason for the physical and chemical changes which appeared to take place in the fat. We hoped, of course, that if we could determine the nature and cause of these changes, their prevention might be possible. This work necessitated a large amount of fundamental research. As a result of it we stumbled on some knowledge which enabled us to work our plant to very much greater capacity, and in fact nearly doubled the output at practically no greater cost. I need hardly enlarge on the financial advantage accruing to us by reason of this discovery.

Correspondence

Readers who have difficulties in any branch of food manufacture are invited to address their inquiries to the Editor. The identity of the inquirer will be regarded as strictly confidential. The same applies to readers who desire to supply alternative answers to or comments upon any of the questions or other matter appearing in the JOURNAL, *unless of course, permission is given by the correspondent to sign or initial them.*

5.—*We wish to prepare a not too expensive Crystallised Fruit Pastille that will stand up on the general market for a considerable period without graining or drying out.*

We suggest that you try the following formula, which has been tested many times and proved to be entirely satisfactory.

Place

17 lbs. sugar,
20 lbs. glucose,
1 lb. aga aga

in a copper and cook together to a strong thread. We do not mention a temperature, as the variation of your sugar and aga will affect the strength of the batch, and it is better that you cook the first time by finger, noting the point with a thermometer and recording it for future use.

Set this batch on one side and allow it to cool, with occasional stirring, while you are preparing this second one:

9 lbs. ground apricot pulp,
20 lbs. sugar.

Add enough water to cut the grain of the sugar and boil also to a strong thread. Now pour this second batch into the first and allow the combination to stand until it is so cool that it begins to thicken.

At this point sift in as much citric acid as your taste demands, flavour and colour the batch, and run it out in dry starch.

The aga should be allowed to soak over night, and in the morning any water left in the vessel should be carefully strained out and fresh water added.

In selecting your apricots it is better that they should be slightly under-ripe, as their jellying powers are greater in this condition.

Bearing in mind that aga jelly is broken down by acid in the presence of heat, you should be quite sure that the first batch is fairly cool before adding the second, and that the combination is thoroughly cooled off before the powdered citric acid is added.

When the jelly is well set up, sift out of the starch, moisten slightly with sugar syrup, and roll in very fine granulated sugar.

After a night's drying, crystallise these jellies in a 33 Beaume Syrup for five hours. After they have dried, separate them and repeat the crystallisation under exactly the same conditions.

If carefully made and well crystallised, these goods should not deteriorate for eighteen months or two years.

Be sure they are *thoroughly* dry before they are packed.

6.—*When it is wished to fill a moulded chocolate shell with a fondant soft enough to flow out, what is the best method to follow?*

There are two popular ways of accomplishing this, and the one chosen is dependent on the type of equipment you have available.

Where two halves are to be moulded separately, and the centre placed in by hand, it is easier to put this centre in in a solid form and then stick the two halves together. In this case a centre of appropriate size may be cast in starch and pressed into one side of the mould while the chocolate is still warm. The other side of the form may be pressed over this and stuck down as usual.

TYPE 1

Prepare a fondant from 80 parts of sugar and 20 parts of glucose cooked to 240° F.

Prepare a syrup from 75 parts of sugar and 25 parts of a standard invert sugar. Cook to 244° F.

Place 50 pounds of the fondant at room temperature in a copper pan and slowly pour 25 lbs. of the hot syrup over it while constantly stirring.

Take the temperature of this batch, and when it has dropped below 140° F., add invertase solution. The exact proportion for standard cream centres will be supplied with full directions for use by any reputable house marketing a reliable brand of invertase. In the case of centres of this type add 25 per cent. more than is recommended for general centre use.

Colour and flavour the batch and run it in *dry* starch. The centres should be used within six hours of casting.

TYPE 2

Where the centre is to be filled by machine or piping bag the following method will prove successful:

Prepare *fondant* as above, place any desired quantity in a copper and melt with as little heat as possible. Melt down some invert sugar by heat only and add this to the fondant with constant stirring until the desired density is arrived at. Use as soon as cooled.

The fermentation of this type of centre is due only to too much water. If the proper combination of sugars is used, 20 per cent. should be ample.

If directions are followed the above centre will *not* ferment.

7.—*Can you supply us with a formula for the soft, chewy type of caramel centre? We have made this type of goods, but find that in a few weeks the pieces invariably sugar off.*

The average caramel is cooked high enough to ensure its not sugaring with a given formula. To make soft, it must be cooked lower and the in-

gredients balanced to prevent granulation. Goods made on the following formula will keep their texture almost indefinitely if well covered with chocolate:

24 lbs. granulated sugar,
30 lbs. glucose,
30 lbs. unsweetened evaporated milk.

Put sugar and glucose into a copper pan (your regular caramel mixing pan, if it has a good active mixer), add enough water to dissolve the sugar and cook to a firm ball. Begin adding the milk slowly, and continue adding, with the agitator running, until all is in. It is best to add this milk so slowly that the batch does not stop boiling.

Cook by water test until the batch has the consistency you wish, then shut off steam, blow out the jacket, and flavour the batch to suit.

When pouring this batch from the kettle, never scrape the sides of the pan nor the lip, as this is very apt to start sugaring in the finished batch.

If a sweeter product is desired, leave out 10 lbs. of the glucose and substitute a like amount of standard invert sugar. This change will also ensure a more tender piece.

Enquiries

The following are extracted from letters we have lately received. We shall be glad to put interested parties in touch with the writers, or to insert replies in the Correspondence columns.

1. "One of our customers has asked us if we can get them 'a recipe for a cheap Sweet Pickle, something like "Pan Yan," required for a medium middle-class trade.' Our thoughts, naturally, turn to you. Can you help us out?"

* * *

2. "I notice that you have a considerable number of advertisements of important manufacturers of food machinery. It occurs to me that through the Advertisement Department of your paper I might possibly be placed in touch with manufacturers of a piece of equipment which is desired by an American food manufacturer—namely, a machine for decorticating white pepper from black pepper. Our American inquirer has been informed that there is an excellent machine for this purpose put out by some British manufacturer, but, unfortunately, does not have the name, and we have so far been unsuccessful in locating the manufacturer of this particular machine."

* * *

3. "In your issue of June FOOD MANUFACTURE we have found a recipe for Lemon Cheese which we consider very satisfactory.

We are now commencing marmalade making, and shall be obliged if you will kindly advise us the proper treatment of thick-cut orange skins to render them soft. We have tried boiling in jam pan and in steam vat, but are not satisfied with results. We also tried bicarbonate of soda, but this gave the skins a green colour as if the soda extracted copper from the pan."

Trade Notes

Wm. Gardner and Sons, Ltd., Gloucester.—On January 4 a dinner was given to the staff and employees of Messrs. Wm. Gardner and Sons, Ltd. the well-known engineers. The Chairman of the Directors, Mr. C. E. Gardner, referred to the successful reorganisation of several departments, and Mr. D. G. Price, Director and Secretary, intimated that the Company had plans for very large extensions of the works.

Thomas Hill, Hull, is exhibiting his Bottle Cleaning machinery at the British Industries Fair, Castle Bromwich, Birmingham, from February 20 to March 2. We have received from this firm, whose address is 247 and 249, Beverley Road, Hull, an interesting booklet describing past and present methods of cleaning bottles, and giving some very useful hints on the subject. Instructions are also given for making a test for cleanliness.

* * *

WE hear that Mr. Robert Whymper, who has for some months been engaged upon important work in Sicily, is sailing for Central America, where he is to investigate some problems in connection with the fermentation and drying of cocoa.

* * *

WE learn that an important firm of biscuit and chocolate manufacturers in New Brunswick proposes to re-equip its factory this year and that British equipment will be used.

An Offer to Subscribers

ANY of our subscribers who apply to Leonard Hill, Ltd., 173, Fleet Street, London, E.C.4, will be presented with a *free copy* of the 3rd edition of "The Chemical Engineering and Chemical Catalogue." Stamps to the value of 1s. should be enclosed to cover postage. This offer is open for this year only, and would also apply to any new subscriptions that are received by the end of February.

The Catalogue is an imposing work of 404 pages, and has become the standard reference work of the factory and workshop. It covers the whole field of chemical manufacture and other production industries, and will be found of very great assistance to anyone connected with the foodstuffs industries. The part devoted to plant, equipment, and products contains a world of useful data, and is profusely illustrated. In addition, there is a classified index of makers of chemicals and plant, together with a handy index to industrial applications, and a list of trade marks and trade names. Another section, with its chemical engineering data and tables, compiled by Dr. D. M. Newitt, is a work of reference in itself; there are invaluable data relating to refrigeration, shafting and belting, crushing, screening, and numerous other matters. Finally, there is a comprehensive list of technical and scientific books, which will prove of great assistance to both commercial and technical people.

Commercial and Legal News

(The Editor does not accept responsibility for any errors which may occur in the following notices.)

London Gazette Information

Merchandise Marks Act.

Report on Honey.

The Standing Committee set up under the Merchandise Marks Act, 1926, by the Minister of Agriculture and Fisheries, the Secretary of State for the Home Department, and the Secretary of State for Scotland, have reported on their inquiry as to whether imported honey should be required to bear an indication of origin. Copies of the Report are obtainable directly from H.M. Stationery Office, or through any bookseller.

Meat, Bacon, Ham, and Lard.

The applications for an Order in Council under the Merchandise Marks Act, 1926, in respect of imported meat, bacon, ham, and lard have been withdrawn and will, therefore, not at present be the subject of an inquiry by the Standing Committee set up by the Minister of Agriculture and Fisheries, the Secretary of State for the Home Department, and the Secretary of State for Scotland.

Merchandise Marks (Imported Goods) Order.

H.M. in Council on December 20, 1927, approved an Order in Council under the above-named Act, entitled the "Merchandise Marks (Imported Goods) Order, 1927." Copies of the Order, when published, may be purchased directly from H.M.'s Stationery Office, or through any bookseller.

Voluntary Liquidations.

(Note.—Voluntary liquidations may, in some instances, refer to companies in course of reconstruction.)

THE NEW PHŒNIX BREWERY, LTD. Resolved, December 13, 1927, that the company be wound up voluntarily, and that Mr. E. W. Oakley, 118, Queen Victoria Street, E.C., be appointed liquidator.

THE CHICAGO BREWERIES, LTD. Resolved, December 29, that the company be wound up voluntarily, and that Mr. R. S. Paterson, C.A., 1, Walbrook, E.C., be appointed liquidator.

DENDY NAPPER, LTD. Resolved, December 12, that the company be wound up voluntarily, and that Mr. W. Boniface, C.A., 10, Serjeant's Inn, E.C., be appointed liquidator. (This notice is formal. All creditors have been, or will be, paid in full.)

Bankruptcy Acts.

Receiving Order, Adjudication, and Public Examination.

SLEEBUSH, JOSEPH, 138a, Romford Road, Forest Gate, Vinegar Brewer. (1312 of 1927) Receiving Order, December 29. Creditor's petition. Adjudication, January 10. Public Examination, 11 a.m. February 21, 1928, at Bankruptcy Buildings, Carey Street, W.C.

New Companies

The undermentioned particulars of New Companies recently registered are taken from the Daily Register compiled by Jordan and Sons, Ltd., Company Registration Agents, 116-118, Chancery Lane, London, W.C.2.

ALLIED DAIRIES, LIMITED. (226409) Regd. December 8, 1927. To acquire certain shares in the capitals of Burgess Dairy, Ltd., and the Manchester Dairy Company, Ltd., and to enter into an agreement with the Federated Trust & Finance Corporation, Ltd. Nom. Cap.: £300,000 in 120,000 pref. shares of £1, 320,000 ord. shares of 10/-, and 400,000 deferred shares of 1/-. Minimum subsn., 7 shares.

DEPTFORD CONFECTIONERY COMPANY, LIMITED. (226417) Regd. December 8, 1927. 291, New Cross Road, S.E.14. To carry on the bus. indicated by the title. Nom. Cap.: £500 in £1 shares.

NORFOLK TRADERS, LIMITED. (226463) Regd. December 9, 1927. To carry on the bus. of millers, agricultural machinery mchts., dlrs. in agricultural produce, etc. Nom. Cap.: £10,000 in 32,000 prefd. shares of 5/- and 40,000 defd. shares of 1/-.

THANET CONFECTIONS, LIMITED. (226472) Regd. December 9, 1927. To take over the bus. of a sweet mnfr. now cd. on at Triumph Works, Ashburnham Road, Ramsgate, Kent, as "Thanet Confections." Nom. Cap.: £2,500 in £1 shares.

LEWIS'S (NORTH WALES), LIMITED. (226488) Regd. December 10, 1927. Avenue Buildings, Bangor. To take over the bus. of tea and provision mchts. cd on at Bangor as "Lewis & Co." Nom. Cap.: £2,000 in £1 shares.

WHITLEY AND DISTRICT TABLE WATER COMPANY, LIMITED. (226494) Regd. December 10, 1927. The Bakery, The Priory, Whitley Bay. To carry on the bus. of mineral water mnfrs. and dlrs. cd. on at Whitley Bay. Nom. Cap.: £1,000 in £1 shares.

GRADE A, LIMITED. (226520) Registered December 12, 1927. To take over the bus. of a baker cd. on at 187, York Road, Battersea, S.W., by John Morley. Nom. Cap.: £1,000 in £1 shares.

PROVINCIAL FISHING COMPANY, LIMITED. (226532) Regd. December 12, 1927. 1, Herring Market, Lowestoft. To carry on the bus. indicated by the title. Nom. Cap.: £3,000 in £1 shares.

SALTED KERNELS, LIMITED. (226617) Regd. December 15, 1927. 276, Coventry Road, Small Heath, Birmingham. To carry on the bus. of dlrs. in nuts and food products, etc. Nom. Cap.: £1,500 in £1 shares.

BRITISH CHOCOLATE AND CONFECTIONERY COMPANY, LIMITED. (226656) Regd. December 16, 1927. 11, Pembroke Terrace, Cardiff. To carry on the bus.

indicated by the title. Nom. Cap.: £40,000 in £5 shares. Minimum subsn., 2,000 shares.

TALBOTS (CONFECTIONERS), LIMITED. (226652) Registered Dec. 16, 1927. 41, Deansgate, Bolton. To carry on the bus. indicated by the title. Nom. Cap.: £1,000 in £1 shares.

F. W. FRANCIS & COMPANY, LIMITED. (226693) Regd. Dec. 19, 1927. 9/10, Railway Approach, London Bridge, S.E.1. To develop and turn to account the property comprised in an agmt.; to carry on the bus. of mchts., traders, importers, and exporters of cheese, biscuits, provisions, and produce, etc. Nom. Cap.: £2,000 in £1 shares.

J. ROGALL & SON, LIMITED. (226728) Regd. December 20, 1927. Spark Street Mills, 5, Spark Street, Leeds. To take over the bus. of mnfg. confectioners cd. on at Leeds by J. Rogall and Son. Nom. Cap.: £10,000 in £1 shares.

BOGABAGH TEA COMPANY, LIMITED. (226720) Regd. Dec. 19, 1927. 4, Fenchurch Avenue, E.C.3. To acquire the undertaking and all or any of the assets of the Bogabagh Tea Company, Ltd. (in liqdn.). Nom. Cap.: £30,000 in £1 shares. Minimum subsn., 7 shares.

STEVENSON'S SUPERFINE CONFECTIONERY COMPANY, LIMITED. (226765) Regd. Dec. 21, 1927. 69, Albert Rd., Bromley Common, Kent. To carry on the bus. indicated by the title. Nom. Cap.: £2,000 in £1 shares (500 pref. and 1,500 ord.).

HARGREAVES STORES, LIMITED. (226951) Regd. December 21, 1927. To take over the bus. of grocers and genl. provn. mchts. cd. on at Sidmouth, Devonshire, as "Hargreaves Stores." Nom. Cap.: £800 in £1 shares.

CONNAUGHT RESTAURANT AND CONFECTIONERY COMPANY, LIMITED. (226783) Regd. Dec. 22, 1927. To carry on the bus. indicated by the title. Nom. Cap.: £1,500 in £1 shares.

FRANK WATTS (CARDIFF), LIMITED. (226862) Regd. Dec. 23, 1927. 22, Millicent Street, Cardiff. To carry on the bus. of wholesale grocers and provn. mchts., etc. Nom. Cap.: £1,000 in £1 shares.

YOUNG & CO. (LINCOLN), LIMITED. (227009) Regd. Dec. 31, 1927. To take over the bus. of pea growers, mchts. and food specialists cd. on at Newland, Lincoln, as "Young & Company," by Tomlinson & Hayward, Ltd. Nom. Cap.: £10,000 in £1 shares.

G. HADLEY (1927), LIMITED. (226956) Regd. December 30, 1927. To take over the bus. of mnfg. confectioners & genl. mchts. cd. on at Cardale St., Cakemore, Halesowen, Worcs., by George Hadley, Ltd. Nom. Cap.: £10,000 in £1 shares.

GOODBODY-MATTHEWS, LIMITED. (227001) Regd. December 31, 1927. To take over the business of mnfg. bakers and confectioners cd. on, inter alia, separately by C. A. & W. Goodbody, Ltd., and H. Matthews & Sons, Ltd., at Plymouth. Nom. Cap. £5 in £1 shares.

WEIGHELL'S DAIRIES, LIMITED. (227070) Regd. January 3, 1928. 232, Manningham Lane, Bradford. To enter into an agreement with the West Riding Pure Milk and Cream Co., Ltd., and to carry on the bus. indicated by the title. Nom. Cap.: £400 in £1 shares.

WATKISS AND JAMES, LIMITED. (226979) Regd. December 30, 1927. Hodges Buildings, Port Talbot. To carry on the bus. of wholesale and retail butchers, etc. Nom. Cap.: £2,000 in £1 shares.

JOHN MAY (CROYDON), LIMITED. (227085) Regd. January 4, 1928. 111, Church Street, Croydon. To take over the bus. cd. on at Croydon; and to carry on the bus. of wholesale grocers, etc. Nom. Cap.: £15,000 in £1 shares (12,000 pref. and 3,000 ord.).

BROUGHTON DAIRY COMPANY, LIMITED. (227104) Regd. Jan. 5, 1928. To take over the bus. of dairymen now cd. on in Nottingham, as "F. Whitt." Nom. Cap.: £1,000 in £1 shares.

(Continued from next page.)

Determination of Starch in Marzipan Substitute. A. Gronover and A. Blechschmidt. (*Zeit. Unters. Lebensm.*, 1927, 53, 250.)

The Mucilaginous Cell Content of Cacao Shells. C. Griebel and A. Miermeister. (*Zeit. Unters. Lebensm.*, 1927, 53, 227.)

The Microscopy and Valuation of Cacao Products. H. Härdtl. (*Zeit. Unters. Lebensm*, 1927, 53.

Rapid Boiling as an Aid to a Shortened Period of Digestion in the Determination of Nitrogen. O. M. Shedd. (*Jour. Assoc. Off. Agric. Chem.*, 1927, 10, 507.)

Spectrophotometric Detection of Boron. W. C. Holmes. (*Jour. Assoc. Off. Agric. Chem.*, 1927, 10, 522.)

Microchemical Investigations of the Iodine in Beverages and Foods. M. Settimj. (*Annali Chim. Appl.*, 1927, 17, 426.)

Constants of Cow Ghee. B. B. Brahmachari. (*Ind. Med. Gaz.*, 1927, 62, 318.)

Glycogen of the Edible Mussel, Mytilus Edulis. L. M. McDowell. (*Proc. Soc. Exp. Biology and Medicine*, 1927, XXV, 85.)

The Titre of New Zealand Mutton Tallows. A. M. Wright and I. Thompson. (*Jour. Soc. Chem. Ind.*, 1928, No. 2, 13T.)

Composition and Examination of Milk Pastry. A. Gottfried. (*Zeit. Unters. Lebensm.*, 1927, 54, 279.)

Wood's Light for the Detection in Wheat Flour of Extraneous and Harmful Seeds and of Extraneous Mineral Substances. G. Cappelli. (*Annali Chim. Appl.*, 1927, 17, 513.)

Determination of Butter Fat and Coconut Oil. M. Klostermann and H. Quast. (*Zeit. Unters. Lebensm.*, 1927, 54, 297.)

Determination of Small Quantities of Benzoic and Cinnamic Acids, with some Notes on the Colorimetric Determination of Salicylic Acid. J. R. Nicholls. (*Analyst*, January, 1928, 19.)

Detection of Hardened Fat in Beef Fat. S. C. L. Gerritzen and M. Kauffman. (*Chem. Weekblad.*, 1927, 24, 554.)

Current Literature

Fruit and Vegetable Products

Cutting Down the Mould Count of Tomato Products. P. P. Mozingo. (*Canning Age*, January, 1928, 19.)

Influence of Temperature on Yield and Quality of Peas. V. R. Boswell. (*Canning Age*, January, 1928, 23.)

Japanese Quince; a New Source of Pectin Supply. C. P. Lathrop and W. L. Walde. (*Canning Age*, January, 1928, 37; *Canner*, 1927, No. 26, 31.)

Presence of Arsenic, Lead, and Copper in Fruit and Fruit Products as a Result of Spraying. K. Lendrich and F. Mayer. (*Zeit. Unters. Lebensm.*, 1927, 54, 137.)

Determination of Sulphur Dioxide in Dried Fruit. P. May. (*Analyst*, 1927, 52, 526.)

Metabolism of Nitrogen Compounds in Dormant and Non-dormant Potato Tubers. W. Newton. (*Jour. Agric. Res.*, 1927, 35, 141.)

Behaviour of Certain Varieties of Pears towards Cold Storage. E. Bottini. (*Annali Chim. Appl.*, 1927, 17, 457.)

Barbary Figs. A. Azadian. (*Ann. Falsif.*, 1927, 20, 464.)

Canned, Cold Packed, and Preserved Fruits in Ice-Cream and Ices. G. D. Turnbow and W. V. Cruess. (*Canner*, 1928, No. 3, 21.)

Sugar Content of Water and Other Melons. S. N. Lutochin. (*Zeit. Unters. Lebensm.*, 1927, 54, 281.)

Importance of Water-Melon Syrups as Foods. S. Lutochin. (*Zeit. Unters. Lebensm.*, 1927, 54, 290.)

Analyses of Fresh Fruit L. H. Lampett and E. B. Hughes. (*Analyst*, January, 1928, 32.)

The Antiscorbutic Fraction of Lemon Juice. VI. E. Hoyle and S. S. Zilva. (*Biochem. Jour.*, 1927, 21, 1121.)

Dairy Products

Milk Supply in Towns. F. E. Nottbohm. (*Zeit. Unters. Lebensm.*, 1927, 54, 201.)

Vitamin A in Dried Milks made by Vacuum and Aeration Methods. R. A. Dutcher, H. E. Honeywell, and C. E. Dahle. (*Jour. Biol. Chem.*, 1927, 75, 85.)

Rate of Acid Production in Heated Milk. E. O. Whittier and A. G. Benton. (*Jour. Dairy Sci.*, 1927, 10, 343.)

Annatto Extract for Colouring Butter. T. L. Rao. (*Madras Agric. Dep. Yearbook* [1925], 1926, 1.)

F.p. of Cream, and Detection of Added Water. F. J. Doan. (*Jour. Dairy Sci.*, 1927, 10, 353.)

Adulteration of Sulphuric Acid to Increase Babcock Test Reading of Milk. W. E. Petersen. (*Jour. Dairy Sci.*, 1927, 10, 261.)

Freezing Points of Cheeses. P. D. Watson and A. Leighton. (*Jour. Dairy Sci.*, 1927, 10, 331.)

Influence of the Age of Milk on the Result of Pasteurisation. A. Wolff. (*Milch. Zentr.*, 1927, 11, 233.)

Determination of Lactic Acid in Milk. J. Straub. (*Rec. Trav. Chim.*, 1927, 46, 866.)

Bromocresol Green as an Indicator in the Manufacture of Grain-Curd Casein. A. G. Bentor. (*Ind. and Eng. Chem.*, January, 1928, 15.)

Composition and Analysis of Danish Butter. A. C. Anderson. (*World's Butter Rev.*, 1927, 1, No. 4, 21.)

Importance of the Specific Electrical Conductivity of Milk and a New Method for its Determination. V. Gerber. (*Zeit. Unters. Lebensm.*, 1927, 54, 257.)

Green Colour in Butter. A. A. Ramsay, A. M. Brown, and H. H. Randell. (*Agric. Gaz., N.S. Wales*, 1927, 38, 475.)

Volumetric Determination of Lactose in Presence of Sucrose. J. H. Lane and L. Eynon. (*Jour. Soc. Chem. Ind.*, 1927, 46, 434T.)

Cereal Products

Composition, Constitution, and Food Value of Residues from the Grinding of Wheat. J. Alquiér. (*Ann. Falsif.*, 1927, 20, 445.)

Application of pH Theory to the Conservation of Grain and Cereal By-products. H. Legendre. (*Compt. rend.*, 1927, 185, 1156.)

Feeding of Rats Exclusively with Various Kinds of Bread. E. Friedberger and E. Seidenberg. (*Münch Med. Wochensch.*, 1927, No. 37, 1573.)

Nutritive Value of Bread, with Special Reference to its Content in Vitamin B. W. Cramer and J. C. Mottram. (*Lancet*, 1927, 1090.)

Various

A New Method of Preserving Sardines. H. R. Beard. (*Kons. Zeit*, 1927, Nos. 48, 49, 50, and 51.)

The Crystallisation of Sugars in Syrups. (*Kons. Zeit.*, 1927, No. 51.)

Food Value of the Nut of Trapa Bispinosa. B. B. Brahmachari and N. K. Chatterjee. (*Indian Med. Gaz.*, 1927, 62, 365.)

Effect of Temperature on the Basic Viscosity of Ice-Cream Mixes. A. Leighton and O. E. Williams. (*Jour. Physical Chem.*, 1927, 31, 1663.)

Experiments on Corn Waste Disposal. C. A. Shaffer. (*Canner*, 1928, No. 3, 19.)

Manufacture of Prepared Mustard. P. H. McBride. (*Canner*, 1928, No. 3, 37.)

Vitamin Content of Technical Soya-Phosphatide Preparations Used in Margarine Factories. A. Scheunert. (*Zeit. Unters. Lebensm.*, 1927, 54, 302.)

Panification with Soya Flour. L. D. Costa. (*Annali Chim. Appl.*, 1927, 17, 524.)

Bottled Cocoa Beverages. J. B. Wilson, W. R. Turner, and J. W. Sale. (*Amer. Food Jour.*, 1927, 22, 244.)

Corrodibility of Metals Used for Cooking Utensils. F. Sprinkmeyer. (*Zeit. Unters. Lebensm.*, 1927, 54, 216.)

Analysis

Detection and Determination of Waxes Mixed with Fats in Foods. N. Charliers. (*Chim. et Ind.*, Special No. 699, May, 1927.)

(*Continued on previous page.*)

Recent Patents

The following abstracts are obtained from recently published copies of the "Illustrated Official Journal" (Patents) by permission of the Controller of H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

278,025. **Confectionery.** P. M. SALERNI. March 26, 1926.

In the manufacture of chocolate liqueurs or similar confections containing alcoholic liquids, in order to prevent the liquid from dissolving sugar from the shell or casing, the casing is provided with a lining or interior coating of a substance such as cacao butter prior to the introduction of the liqueur or liquid. The lining is applied by introducing cacao butter or the like into the casing to cover the interior surface, and then removing all of the cacao butter with the exception of a layer, which remains upon the inside of the casing. The introduction of the cacao butter may be effected by a nozzle inserted through the casing, surplus cacao butter being withdrawn through the nozzle; after introduction of the liquid the hole is closed as by the insertion of chocolate with cacao butter applied thereto.

278,089. **Meat-presses.** G. DE VOOGHT. July 1, 1926.

A mould for shaping boneless hams.

278,152. **Mixing-machines.** A. SONSTHAGEN. September 2, 1926.

A mixing-machine for chocolate, etc., comprises means for giving the material a swirling motion in a pan in one or more horizontal layers, and also means for imparting movement in a direction at an angle to the horizontal.

278,249. **Moulding dough, etc.** W. RUSSE AND NORD-BOHMISCHE WAGGONUND MASCHINENBAUGES. March 14, 1927.

Dough-working apparatus.—Relates to apparatus for grooving plastic substances, more particularly to produce cup-shaped bread rolls with radiating leaves, of the type involving a rotary cutter head with ribs co-operating with a moulding pan; and comprises a cutter head, preferably mushroom-shaped, combined with a moulding-pan having an axially-movable bottom portion and a lid, either the lid or the bottom plate being rotatable during the operation of the head so as to place the material under stress.

278,878. **Bakers' ovens.** G. SCHIERZ. October 4, 1926.

279,085. **Sterilising liquids.** G. A. KRAUSE. October 12, 1927. (Not yet accepted.)

Water and other liquids are sterilised by being brought into contact with or introduction into numerous bodies of regular or irregular shape composed of or coated or otherwise combined with metals, such as copper or silver, or alloys capable of destroying micro-organisms, the bodies being arranged to divide up the liquid and expose it to a large contact area. The bodies may be in the form of balls, short rods, pieces of wire, woven or plaited fabric, or fibrous or granular matter, and may be loose in the treatment vessel or inserted in a bag, cage or other holder, or may be fixed so as to maintain predetermined spaces therebetween. The vessel, for example, may have tubes or other projections rising from its walls or bottom, and its walls may be composed of or wholly or partly coated with the metals or alloys. The liquid may be stationary in or may flow through the vessel. The treatment may be preceded or followed by filtration, which may be in a filter containing the metals or alloys, and in the treatment itself the bodies may be disposed to give a filtering effect. The sterilising device may have heating and cooling means, and also means, such as a stirrer, pump, or a device for introducing a blast of air or other gas or vapour acting continuously or intermittently, to agitate or move the liquid. Reference is made to the prior use of vessels lined with, or containing wire formed from the metals or alloys, and of filters consisting thereof or coated therewith.

279,122. **Obtaining oil and food from seeds, etc.** E. A. ANDRE. October 17, 1927. (Not yet accepted.)

Oil-seeds—*e.g.*, linseed, sunflower seeds, and sesamum seeds, or their cakes, are defatted by solvents, and the residue is milled in the usual manner to produce food for men or animals. In an example, linseed meal is exhausted by a neutral solvent, and the residual powder divided by sifting into episperm and kernel. The latter may be treated with proteolytic ferments to produce peptones of agreeable odour and flavour.

279,152. **Moulding biscuits, etc.** W. DREDGE. July 16, 1926.

Cylinder machines; stream cutting machines.—Biscuits are formed, particularly from soft dough, by feeding separate pieces of dough of predetermined size into moulding cells in a rotary drum, etc., and moulding and embossing them therein by the action of reciprocating dies. The machine comprises a rotary drum provided with rows of radial moulds adapted to receive lumps of dough from a divider and fitted with pistons which are forced outwardly by springs to emboss the dough and eject the moulded biscuits and are moved inwardly by fixed cams.

279,155. **Moulding dough.** H. W. CHEETHAM AND J. W. CHEETHAM. July 19, 1926.

Pie-moulding machines; cutting-apparatus.

279,607. **Moulding pies, tarts, etc.** J. P. JACKSON. September 29, 1926.